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THE INCREASING DEMAND FOR COTTON.

An American cotton crop of 14,000,000 bales is none too large to meet the normal demands of spinners throughout the world, assuming that the crops of other countries remain about the same as they have averaged the last few years, the yearly variation in which has been of little material consequence. Therefore, under ordinary conditions, which may reasonably be expected to prevail during the next eight or ten months, the nearly 13,500,000-bale crop of this season should be no more than sufficient to meet the annual wants of the manufacturing world on a basis of ten cents for the middling grade in New York. As the spinning capacity of the world is now, an average crop of 12,500,000 bales, for a series of years, would mean a scarcity in supply near unto famine. Hence, we do not look upon the unusually large amount of stock of 1,844,992 bales in the hands of American manufacturers on the first of last March with any degree of apprehension as likely not to be wanted for early and needed consumption, without disturbing trade conditions affecting the price of the supply that remains unsold, except so far as having a regulating effect in steadying values. In this connection it should be borne in mind that the world's visible supply of American and other growths of cotton is less, to-day, than it was at this time a year ago, and the invisible supply, or that held by spinners, is only 1,500,000 bales more, wholly American, or equal to about five weeks' consumption, enough, no doubt, to regulate prices to such an extent as not to militate against the interests of manufacturers and the trade.

The extra supply of American cotton in the hands of the spinners of the world, as compared with last year and the year before, notwithstanding the business depression affecting manufacturing operations since the fall of 1907, is chiefly due to the exceedingly excellent quality of this season's cotton for spinning which has been secured at a relatively low cost, which is not likely to occur or present itself again within the immediate future. In consequence of this likelihood, and taking advantage of an opportunity seldom at hand, spinners have bought or secured themselves of this extra quantity of cotton, more than ordinary needs might warrant, so that they may have their raw material, or a good proportion of it, of superior quality,—in grade, staple and cleanliness,—at a comparatively low cost. This latter item is not to be measured by the market price per pound, alone, but there should also be considered the amount of waste made in the process of manufacture, of the yarn product. This waste problem is an important one. For example, this season's cotton is probably five per cent. less wasteful than that of 1906-07, not only because less trashy but healthier in fiber, making a difference of three quarters of a cent a pound in the yarn product, based on ten cents a pound for the raw material of the latter season's growth. Proportional to the consumption, the American spinners, in this appreciation of the relative and positive value of this season's cotton, have taken more ad-

vantage of their opportunity in securing an extra quantity of it than have the foreign spinners.

The rapidly increasing number of spindles throughout the world is having its effect on the wants for the raw material, and if this increase continues for the next decade the same as for the last decade, an American crop of fully 16,000,000 bales will be in demand for normal requirements. According to the census, just at hand, of the International Federation of Master Cotton Spinners' and Manufacturers' Associations, the estimated number of spinning spindles at work, and operated by power, in the world, is 130,795,927, or 5,700,000 more than a year ago. The larger portion of this increase has been in Great Britain, showing that that country is far from exhibiting a decline in cotton spinning, and that it has the courage of acting on an apparent belief that the requirements of the world will stand for this addition to the capacity of manufacturing. What is well for Great Britain must be well for the United States, and when it is considered that cotton can be freighted as cheaply from New Orleans or Galveston to Liverpool and Manchester, or within one cent a hundred pounds, as to any New England point, or to any South Atlantic point, by overland, it will not appear strange, that, so far as the cost of the raw material is concerned, British spinners stand at no disadvantage compared with those in this country.

The number of spindles in the world on long staple cotton, as Sea Island and Egyptian, are principally in Great Britain, in the vicinity of Manchester, or about three-fourths of them. There are as many spindles on this kind of cotton in the United States as in any other country except Great Britain—about the same as in Germany, and more than in either France, Russia or Austria. This comparative status is not without its significance in its relation to fine spinning in the manufacture of goods for those in affluent circumstances. But of equal significance is the spinning of the shorter staple cotton as the Upland American, East Indian, etc., which enter into goods for the great mass of mankind. The expansion of cotton spinning will hereafter, as heretofore, depend on the supply of this latter class of cotton, for it appeals directly to the necessities of, at least, 80 per cent. of the world's population, of which nearly 60 per cent. are Oriental, so to speak, in custom and fashion, so far as clothing is concerned. There is an especial field for increasing the consumption of cotton manufactures with this latter order of people, because of their immediate exposure to the civilizing influences of European culture, and their disposition, however conservative and moderate, to be swayed by it. If it were possible,—and it is by no means chimerical,—to increase the consumption of cotton manufactures among these people to the extent of only five pounds of the raw material, per capita, it would call for 10,000,000 more bales of cotton than is now grown. This is where the educational influences of civilization can be profitably extended for cotton goods. If fifteen or sixteen more yards of goods, per capita, can be annually sold to these people, there will be a demand for an additional supply of 10,000,000 bales. This is, seemingly, within a reasonable possibility when it is considered that the principal articles of clothing are made of cotton.

To satisfy the increasing demand for cotton fabrics from the Oriental class of people, there will always be a trade for those made from coarse yarn in contradistinction to fine yarn, as it is generally understood, that is No. 40 and upward. Therefore, so far as the United States industry is concerned, there will always be a call for coarse goods for an export trade with Oriental nationalities, to be accepted or not as may please the necessities of manufacturers. Accordingly, it would be a sacrifice of an excellent trade position were the manufacture of coarse cotton goods in this country neglected in favor of that of fine goods, however desirable and felicitous it might be to encourage the latter. Fully 86 per cent. of the spindles of the world are on coarse and medium yarns, and this proportion must remain essentially the same for years to come, rather increasing than decreasing toward them.

In a recently published article from the Bureau of Statistics of the Department of Commerce and Labor, Washington, D. C., comments are made upon Oriental trade in which the following appears:

"Large sales of cotton goods by European manufacturers to the people of the Orient have been built up and maintained, primarily by making goods of texture, colors, and patterns to suit the local markets of the various sections to which they are sent; prices and terms to meet the customs and requirements of the people; the maintenance of agents in those sections of the world to study business conditions, social customs, and, therefore, the requirements of the markets; the establishment of banking facilities and methods by which long credits may be extended; a plentiful supply of carrying facilities, and cheapness of production by the home manufacturers. The small percentage which the United States manufacturers have in this trade is apparently due to the indisposition at the present time of American manufacturers to devote to that foreign trade the detailed attention given by European manufacturers, including the special manufacture of goods to suit the local markets; the maintenance of trade representatives in those fields. Should the development of new industries in the Orient displace the hand trades, as has already been the case in certain sections, the oriental market for factory-made cotton cloth would thus be enormously increased."

ALIEN HELP IN TEXTILE MILLS.

The more indigenous becomes the blood of the American citizen, or the further it becomes removed from its foreign origin, and partakes of the spirit of American political and social institutions, the more averse it is to factory employment in competition with that which is alien and willing to accommodate itself to a lower standard of living. It was not many years ago, quite within the memory of the present generation, when the textile mills of New England were operated by help obtained from the native born of the neighboring population, the same as is exemplified to-day in the manufacturing communities of the South. Great changes have taken place in the character of the factory help in New England within the last decade or so, till now it is a comparatively rare thing to see a person of American lineage performing any of the ordinary labors in the mill, preferring other avocations that have not yet lent themselves to the aspiration of the alien. The factory and its environments, to-day, is a palace compared with its predecessor thirty years ago, and, itself considered, is far from being objectionable as a place of employment, but rather, in some respects, is inviting, and would be more attractive to those of native birth were it not for the social odium of associating with a class of people that is foreign in speech, habits, and ideas of living, and which, moreover, is willing to labor for wages below those that are considered necessary to sustain a standard of respectibility.

As a concrete example of the tenor of the foregoing

observations, we have a confidential record, so far as the name of the establishment is concerned, of a cotton mill in one of the principal textile manufacturing localities in Massachusetts, as representative of the whole of the mill community, to the following effect. This particular mill has a labor roster of 2300 persons representing seventeen nationalities,—American, 25.01 per cent.; Pole, 18.84 per cent.; Irish, 14.16 per cent.; French, 10.76 per cent.; Greek, 10.67 per cent.; English, 6.70 per cent.; and 13.86 per cent. Portuguese, Russian, Scotch, Macedonian, Austrian, Turk, German, Italian, Armenian, Swede, and Spaniard. This enumeration is interesting as an exhibit of the cosmopolitan character of the textile mill population of New England, to be seen more positively in large than in small places, as every nationality is more or less clannish, and the former offer more opportunities for an inclination of this kind. This class of people, for all purposes required of them in mill practice, are valued for efficiency as highly as are those of American birth, and from a sociological point of view soon become unobjectionable as they and their children come to be imbued with the essence of American ideals of living. It is, nevertheless, an interesting feature in the phenomena of social changes in the manufacturing communities of New England and in those of many other Northern States, of the native born being urged out or forced out of occupations in which they had become adepts, by people of foreign climes, who have left their homes, temporarily or permanently, for those in a new land where the opportunities are better for improving their conditions.

It may be noted that in the mill alluded to, the Poles outnumber any of the other foreign nationalities, and with the Russians, constitute 22 per cent. of the number of persons employed. Thus it will be observed the strong hold the Slavic immigration has upon furnishing employees for the textile mills of New England. Their manner of living is such that they are ready and anxious to work for less wages than an American is willing to accept. They thrive after their own fashion on scanty supplies of salt pork, flour, cabbage, potatoes, and the like, while they of Anglo-Saxon origin expect good proportions of flour, fresh meats, butter, cheese, and all garden vegetables that are in the market. They predominate in the picking and carding departments, both men and women, with a good proportion in the weaving department, while they are particularly sought for the dye-house.

The help in the mill in question seem to be fairly constant in their service of employment, as the pay-roll shows that more than five-sixths of those employed remain at work for more than one year, and mire than five-eighths stay from one to ten years, and a few show a service of forty to fifty years, but it should be said that those of many years' engagement are not from the class of modern immigrants, and if not native are either Teutonic or Celtic in origin.

The textile industries of New England depend for help almost wholly upon immigrants, and were it not for this class of people it would be impossible to operate the mills. While the vast majority of these are common laborers and servants, no inconsiderable number are skilled workmen, though only few have had training in textile employment. This transition from native to alien help has not yet been experienced in the manufacturing communities of the South, but it is safe to say that it will not be long before it is seen here, though its appearance will be with more reluctance because of the aversion to any affiliation with the negro on any plane of employment. The aversion, however, should be no greater than that manifested by the native Southerner who finds a way of associating only with those of his own color.

The immigration of foreigners to the manufacturing States of North and South Carolina, and Georgia is practically nothing, or less than a sixteenth of the total for the United States. But this can not continue with the rapid advances that are being made in manufacturing in these States, and the demand that will be made for a population of mill workers, which can not be supplied from the sources heretofore depended on. This matter of an adequate supply of labor will be a very lively problem for Southern manufacturers to solve when business returns to its normal status of activity. It was becoming a vital one at the time the business depression made its appearance a year and a half ago, and it is sure to reappear in an aggravated form with every upward and progressive step made in the productive industries of this section.

It may be noted that more than half of the white population of the United States consists of those foreign born or native born with foreign parentage. This lineage distinguishes the population of New England and the middle West much more than that of the Southern States. In the former section of the country, 518 persons out of every one thousand are of foreign blood, while in the latter section only seventy-nine in one thousand are so classed. This is an economic question in Southern sociology that must be confronted within the immediate future by manufacturing communities, and the sooner it is rightly and intelligently met the better for all concerned.

THE CUSTOMS TARIFF.

The revision of the customs tariff goes on apace, and what it will finally be must be left to surmise. The only thing assured is that it will be protective, in its purpose, to American industries. From present appearances, the modifications in the textile schedules that seem suggestive of final enactment are of small consequence, and scarcely sufficient to warrant the endeavors for tearing apart the sections in expectation of finding something to improve. The tariff bill as it left the house committee on ways and means, and as it was received by the Senate, so far as it relates to these schedules, was a mixed up affair with little evidence of its provisions having been intelligently or circumspectly digested in relation to their effect on the industries to which they applied. While we are not wedded to the idea of a tariff commission, as is advocated by a number of commercial bodies, there is exhibited in the first draft of the tariff bill a sad need of enlightenment on the status and necessities of the industries affected, due to the non-possession of reliable and unadulterated facts which an unprejudiced commission of experts might have furnished.

The committee on ways and means were apparently incompetent to separate the chaff from the wheat in the testimony that was presented to them for formulating the several paragraphs and clauses so that they should be clear and logical in their meaning, and effective in their intent, while conforming to popular sentiment regarding a revision of the tariff laws without prejudicing the industrial status of manufacturing and other productive vocations. This manifestation of incompetency on the part of a congressional committee, charged with the highly important function of recommending measures for obtaining revenue for the necessities of the national government in carrying

out the dictum of congress, will have more effect on public thought for the establishment of a commission, or something of this sort, than most anything else.

It may be considered fortunate that the tariff does not reside for its practicability in the judgment or proposal of an unqualified committee on ways and means. In the present instance, the measure will receive its practical or working features at the hands of the Senate committee on finance, composed, as it is, of long trained experts in matters pertaining to tariff legislation and customs interpretations. Whether all will agree with the provisions in the bill that may be proposed by this committee is a question quite apart from the one that there will, at least, be a consistency in its parts, based on the decisions of the United States board of general appraisers, the treasury department, and the courts. Such a committee stands in little need of an active commission of tariff experts, so to speak, as it is composed of as highly trained experts on matters of this kind as it is possible to find. We do not assume to say that it will discuss the measure it may contend for in the exact words or phrases or even rates of duty, that may be first suggested, as features, to effect desired results in the final conferences with a committee of the house of representatives, are likely to be introduced, but we do say that the bill as finally enacted will be essentially that framed by the Senate and more especially by the finance committee.

We do not expect to see any provision made in the new tariff law for a tariff commission, but there is an evident purpose to provide means for the gathering of facts and information by a body of qualified persons for use by members of congress to guide them in arriving at some intelligent idea or conception of the necessities of the industries upon which legislation is required or asked for. There are some objectionable features about the establishment of a tariff commission, as has been proposed, as being of doubtful utility, and because of a natural disposition on its part of too frequently publishing statements and ventilating its opinions on facts and information, in order to justify its existence in the popular mind. There may, however, be some warrantable arguments for the establishment of a permanent body of tariff experts to be known as a tariff bureau with functions to study the workings of our own and foreign tariffs in their relations to one another, specifically to aid the executive departments of the government in a judicious and legal administration of the laws. Such a bureau may be a convenient, if not an absolutely essential, auxiliary to the president in administering the provisions of the tariff act relating to the system of maximum and minimum duties and other features of more or less complexity where expert knowledge or information is of the utmost importance and consequence.

AMERICAN COTTON MANUFACTURERS' ASSOCIATION.

The next convention of this association will be held in Richmond, Va., at the Jefferson Hotel, May 25 and 26.

NATIONAL ASSOCIATION OF HOSIERY AND UNDERWEAR MANUFACTURERS.

The annual convention of this association will be held, May 11, 12 and 13 at the Continental Hotel, Philadelphia, and the machinery exhibition in connection with it will be held May 10 to 15, both inclusive, at 919-921 Walnut St.

DANIEL J. SULLY'S MISSION IN THE SOUTH.

A Matter in Which Cotton Growers and Spinners Are Interested. A Conservative and Practical Plan. Prepare a System of Warehouses and Negotiable Certificates Representing Cotton Values.

(*Specially Contributed to* Cotton.)

My present mission in the South is in connection with the materialization of a constructive plan which will improve the financial status of the great cotton growing interests of the South, place the farmers in an independent position to which they are legitimately entitled, and establish an economic basis upon which the price of cotton can become more stable. These are desiderata that concern the spinner as well as the planter, if not so directly nevertheless quite as potently. The spinner is as much affected in his business operations by the course which the price of cotton takes as is the grower of the staple. Stability in the market value of cotton is of immense conse-

Daniel J. Sully.

quence to the spinner for the successful distribution of his own products at a satisfactory remuneration to a contented customer. Nothing is so demoralizing to any vocation or business as radical fluctuations in the price of any article of large consumption. In this respect everyone, from the grower of cotton to him who manufactures it, is equally affected in some form, and to this extent is vitally concerned in any scheme which will bring about conditions that will produce a just equilibrium in prices as affected by a proper relation between supply and demand. It is this conception of a plan in which I am obtaining the attention and active co-operation of the cotton growers and banking interests of the South as being the immediate beneficiaries of what it can accomplish in not only bringing wealth and the sinews of wealth into the South, but to this extent contributing to the wealth of the nation and the material enjoyment of all lines of business, for the prosperity of one section vitalizes that of all sections.

My plan of operation is every way conservative, and

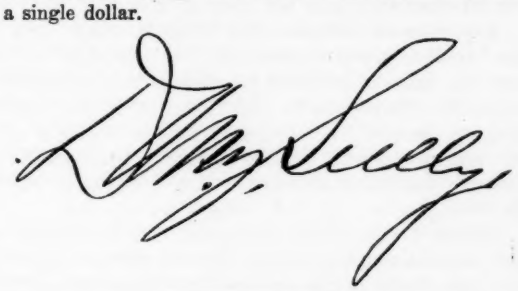
notwithstanding its apparent vastness and scope it is an embodiment of simplicity and practicability, easily understood by any discerning man. It is this feature of it that should appeal to the intelligence of this part of the country, especially when it means an actual cash saving of over $200,000,000 annually, as representing so much value lost in the methods heretofore pursued, and which can readily be saved.

My plan is nothing more than materializing that which has been evolved by the Farmers' Union, and quickening it by the necessary financial backing or assistance which is at hand and ready for use whenever the time comes for bringing it into activity. A minimum fund of ten million dollars will be subscribed, and made available, by conservative financiers for carrying out the plan, which, in a few words, is based on the establishment of a chain of warehouses throughout the cotton producing section of the South, sufficient in number and capacity to store at least one-third of the annual crop, which amount, as has been demonstrated, is enough to control the distribution of the entire crop in conformity with the laws of supply and demand, and free the market from spasmodic or occasional congestion, which has so frequently been the cause of trade demoralization in which the manufacturing interests have suffered with an acuteness quite as irritating as that experienced by the holders of the staple.

The working of the warehouse scheme is simplicity itself, as already intimated, and in its operations the procedure consists in the planter, for example, depositing his cotton in a responsibly bonded warehouse and receiving therefor a certificate certifying his ownership in the cotton. This certificate is as substantial, representing value, as the cotton for which it stands, as back of it is a guarantee of millions of dollars, and moreover it has the elasticity of a negotiable instrument which can be sold or otherwise disposed of like a United States treasury note. Upon it, the planter can borrow, if need be, from his banker enough to liquidate his debts or pressing obligations, and at the same time not lose the ownership or control of his cotton which he can hold till he believes the opportune moment has arrived for him to sell it. Nothing could be more feasible, and, withal, more simple, and sound as a financial proposition.

The benefit that the cotton grower derives from his acceptance of the plan proposed is that he retains the ownership of his property and can do with it what he pleases in the way of selling it at any time that he chooses, at the same time he has at his command the procurement of a negotiable certificate that he can utilize in obtaining money for meeting any of his requirements or obligations. The natural effect of this methodizing the marketing of the cotton crop of the South, upon the planters and others that come within its sphere of operation, is to familiarize the community with modern business methods of husbanding its resources, and utilizing their potentialities, to its greatest advantage. In this phase of it the scheme proposed will be an educational power among the people of the South for inculcating correct and systematic business ideas how to conserve the value of their possessions which are so abundantly given them from a fertile soil and equable climate. The cotton growers of the South have been unappreciative of the real value of their chief agricultural product. They have not been altogether at fault in this respect, as they have had no means at their command other than to dispose of their cotton at the best price they could get from the buyer that happened to be on the spot at the time it was offered for sale. In other words, they have been at the mercy of the buyer. They have now presented to them a plan that will place them on an independent footing and enable them to be their own masters, and dispose of their own property at what may seem to them a propitious opportunity.

The people of the South are to be given the first chance to invest in this project, which will bear the most rigid investigation as a financial proposition. Be that as it may, the plan will be carried through and become operative with a rock-ribbed backing, whether or no the South invests in it a single dollar.



THE TARIFF ON KNIT GOODS.

OFFICIAL OPINION OF FRED. W. SIMONS, PRESIDENT OF THE NATIONAL ASSOCIATION OF HOSIERY AND UNDERWEAR MANUFACTURERS.

The following are abstracts of views expressed by Fred W. Simons, president of the National Association of Hosiery and Underwear Manufacturers, regarding the customs tariff, in correspondence with H. E. Miles, chairman of the Tariff Commission of the National Association of Manufacturers:

The National Association of Hosiery and Underwear Manufacturers is overwhelmingly opposed to the creation of a tariff commission "to act on its own initiative."

I am convinced that such a commission as you propose would not—on the contrary, it would make continuous and perpetual an evil that is now only periodical.

I believe that a commission such as you suggest to investigate on its own initiative wherever its own good pleasure might suggest would be a constant menace and danger to almost every industry; it would be "in restraint of trade" in the fullest meaning of the words, and the position of no industry would be secure.

There can not be any such thing as over-protection to any industry that is open to the unrestricted competition of eighty millions of people.

In nine out of every ten of our industries, domestic competition is such that it is impossible for the producers to obtain unfair prices for their merchandise, and domestic competition is all that such industries ought to be subjected to—they are entitled to be free from the competition of foreign producers working under entirely different conditions. The main thing is to have enough protection; more than enough is superfluous, of course, but in nine cases out of ten it is perfectly harmless.

This country ought to have such protection as will entirely eliminate foreign competition upon all merchandise that can be produced here with as little expenditure of human effort as is required to produce it anywhere else.

The whole basis of the prosperity of the United States

is the high wages paid to American labor, which high wages are rendered possible only by the fact that high protection secures for the products of that labor a market at correspondingly high prices. There are those who think it necessary to limit the amount of protection in order to prevent the American manufacturers from plundering the people. I think on the contrary that domestic competition is enough for that purpose and when the amount of protection is limited a dead line is drawn beyond which the industry affected can not progress. Nearly all textile industries of this country have been up against that dead line for some time.

You advocate protection and at the same time you demand trade treaties and reciprocity and clamor for foreign markets. The two purposes are antagonistic to each other. Aside from the unfairness of trying to exclude foreigners from our markets while trying with all our might to force our way into theirs, the two purposes are antagonistic. You are building up with one hand and pulling down with the other.

To me it is a very singular and very regrettable fact that most students of political economy seem to be infatuated and obsessed with the delusion that a great foreign commerce is essential to the prosperity of a nation.

There are two prime essentials to the prosperity of a nation. One is to keep the people steadily employed and the other is to see to it that they reap the benefits of their own labor.

A tariff is a protective tariff just to the extent that it restricts or prohibits the importation of the products of foreign labor that would be competitive with the products of American labor if imported, and it is not a fully protective tariff unless it is practically prohibitive.

What a protective tariff does and all it does is to keep producers of the protected country clear of all foreign competition.

WILLIAM F. DRAPER, JR.

Cards have been received from Paris bearing tidings of the death (March 18) of William Franklin Draper, Jr., son of General Wm. F. Draper, of Hopedale, Mass., for many years president of The Draper Company. This news will be read with deepest regret by all interests identified with the textile industry both North and South as well as in Europe, as Mr. Draper numbered his friends by the score on either side of the Atlantic. He was born December, 1866, at Hopedale of ancestry long distinguished in the social, political and manufacturing circles of his home State. His early school days were passed at West Newton after which he prepared for Harvard by a course at Phillips Exeter Academy. One year spent at Harvard, where he was rated one of the most popular and efficient men in his class, found him ready to enter business. As is customary in the Draper family, he began at the bottom of the ladder with three years' apprenticeship in the shops, showing such aptitude that he was then admitted as a partner in the firm of George Draper & Sons with duties connected with the selling department.

Mr. Draper was the first of the family to represent this great house, afterwards incorporated as The Draper Company, in the South. It was largely due to his personality and efforts, combined with the mechanical excellence of the machine, that the Draper loom became a modern essential in the manufacture of cotton goods. His versatile mind, not content with the mere disposal of a product, was ever alert in perfecting its wonderful and intricate mechanism so that to-day many of its valuable features are directly attributable to his inventive genius.

Many years spent in the South resulted in Mr. Draper's becoming one of the most widely known and best beloved men who traveled the territory. Failing health followed his intense application to business and when some ten years ago he was compelled to retire from such an active life the hope was universal that a complete rest would soon permit him to return once again to a field from which he could ill be spared. The hope of his multitude of friends was disappointed. Several years' residence abroad failed to bring about any improvement in his physical condition and his health was never recovered to the point of restoring him to former vigor.

ELECTRIC DRIVE FOR COTTON MILLS.

THE SQUIRREL CAGE TYPE OF INDUCTION MOTOR HAS TAKEN THE PLACE OF THE INTERNAL RESISTANCE TYPE. COST OF AN ELECTRICALLY DRIVEN PLANT. INDIVIDUAL MOTOR DRIVES.

BY J. K. W. DAVENPORT.

PART II.

With the electrically driven system it is not necessary to install a separate lighting plant, as this can be taken care of by the main generators which are used for power purposes. With the mechanical system it is necessary to maintain an individual unit for lighting.

For a long time the interior resistance type of induction motor was considered the best for cotton mill work, the reason being that as the motors are usually suspended inverted from the ceiling, it is hardly possible to use compensator starters with them and to place these starters at convenient points. All passageways must be left clear. Since the development of the squirrel cage type of induction motor, however, this type has taken the place of the internal resistance type. Besides having the advantage of the possibility of placing the starting apparatus at a distance from the motor, the squirrel cage type has the added advantage of having no collector rings or brushes on which lint and dust can collect. This reduces considerably the fire risk. Another objection overcome by the squirrel cage type of motor is that less trouble is apt to result when the motors are started by inexperienced persons.

It has been stated by engineers associated with this industry that the squirrel-cage type motor if properly designed would undoubtedly prove more satisfactory from an operating standpoint than the internal resistance type motor, if it were not for the fact that the squirrel-cage type motor draws such a heavy starting current. With the new squirrel-cage type motor of the Crocker-Wheeler Company, designed to give 30 per cent. of full load torque, the voltage of the line being maintained normal, it is possible to furnish a motor that will not draw more than 150 per cent. of the normal running current at starting. This motor has proved satisfactory for cotton mill service, especially because the load conditions imposed on the motors at starting are generally light. From tests it has been found that the average friction load of a motor driving groups of machinery in cotton mills does not exceed 20 per

cent. to 25 per cent. of the full rated load of the motor. In other words this is the condition under which motors are started. With these conditions obtaining, the squirrel-cage type motor taking 150 per cent. starting current does not have a bad effect upon the system as a whole.

Many claims have been made as to the increased cost of the electrically driven system. These claims and figures have all been based on the single mill that was to be erected and never took into account the fact that increases to the plant might be desired in the future. The general claim has been that the first cost of a plant designed for electric drive exceeded the first cost of a mechanically driven plant by an amount equal to the cost of the electrical equipment. The writer admits that this might be true for mills under 25,000 spindles capacity, but does not hold for mills of larger size. If two mills contemplating an increase in size, are both designed to take care of the increase, then the electrically driven system has an advantage. In the case of the mechanically driven mill it is necessary to install shafting of sufficient weight to take care of the proposed increases and to install either one side of a compound engine or to install the complete compound engine and operate it at a reduced steam pressure until such time as the mill is increased and the load is brought to normal. All the power for the whole plant is concentrated in a single unit, doing away with one of the great points that is gained by the use of the electric system, flexibility.

In the electric system it is a simple matter and has been deemed advisable to install more than one unit where the requirements of the plant exceed 400 H. P. In the case of the electrically driven system it is possible to design the first mill building with reference to the present needs only, designing the power house large enough to accommodate the future units that may be required when the mill buildings are extended. It is a very simple matter then to construct buildings and place the motors desired.

Another point is that where the mechanical system is determined upon for a plant the character of the goods to be manufactured in the plant must to a certain extent be determined. This of course is not true in the case of the electrically driven mill, as it is possible to change the units to suit the future conditions, and it is a very easy matter to change the speed when this is necessary for a change in goods. It has also been found that when a mill has been running upon a certain class of goods and the market conditions change, it is a very easy matter to change the speeds of the various machines by simply replacing the motor pulleys with pulleys of a different size, thus changing the speeds of all machines driven by any particular motor.

In some of the more recent electrically driven mills the spinning motors have been direct coupled to the shafts, these shafts being operated at a speed of 600 r. p. m. and two spinning frames driven from the same shaft by means of an endless belt. This form of driving has proved quite satisfactory where the shafting has been heavy enough and where the centers between the driving shaft and spinning frame pulley were left a sufficient distance apart. Where the centers have been reduced it has been found that this form of driving increases the repair cost as to belting and also places an abnormal strain on the bearings of the spinning frames, which are then hard to keep in alignment.

The average speed of shafts in cotton mills does not exceed 300 r. p. m., which is considered a good conservative speed for the type of boxes used in the hangers that support the shafts.

Individual motor drive has been but slightly referred to in this paper. It may be well to say that the only machines that have been commercially operated with individual motors in this industry are looms. This statement applies more particularly to the cotton industry than to the other allied textile industries, as there have been some successful applications to various other machines in silk and woolen mills. This is a subject by itself and can only be lightly touched upon here. Using individual motors for looms is an advantage where automatic warp stop motions are used, inasmuch as when the warp stop motion acts the motor is automatically cut out and the loom stops.

The size of motor for individual looms varies in accordance with the character of work and the size of loom that is to be operated. A great number of applications have been made with the squirrel cage motor, varying in size from one-fourth to three-fourths H. P. The motors are geared direct to the loom shaft. A switch controlling the motors is operated by the shipper lever of the loom, so arranged that the switch may be opened not only by hand in the ordinary manner, but also automatically by connection of the electric warp stop motion, and also filling stop motion when the latter is used. It is also connected so that it will open automatically should the loom be started with shuttle not in its proper position.

The individual application of motors to looms has attracted considerable attention, and the particular advantages claimed over the belt drive are as follows: (1) The automatic stopping of the loom in case of breakage of warp threads or filling. (2) Increased production of the loom by 5 to 7 per cent. (3) Reduction of maintenance cost. (4) A cleaner weave room inasmuch as there is no dust carried by drafts due to the movement of pulleys and belts, which is of great advantage in the manufacture of silks, fine dress goods, etc. (5) The elimination of overhead shafts and belts, thus avoiding any possibility of oil stains on the goods, which would materially affect their value.

Another advantage not listed above, but obtained by the use of individual motors, is that they may be placed in a building in which the cost of construction will be less than that of a building designed for mechanically driven looms. This is particularly advantageous in the case of a mill using a weave shed, and does not apply with the same force in the case of a mill designed for both weaving and spinning. The expenses incident to the application of individual motors is quite high and does not appeal so strongly to manufacturers who are making the coarser grades of cotton goods as it does to the manufacturers of fine lawns, dimities, silks and fancy goods. The warp and filling stop motions may be applied to belt driven looms in which case it is necessary to install a small direct current low voltage generator for operating this automatic stop feature.

Throughout the South at the present time a great number of water powers are being developed. Very nearly all this power will be used in cotton mills. The electrically driven mills now using steam as motive power undoubtedly will be changed over so as to utilize this water power, as the power will be sold at an advantageous figure.

There are many different kinds of fastness, and the most important are undoubtedly fastness to light and washing.

National Association of Cotton Manufacturers.

THE ANNUAL MEETING IN BOSTON, MASS. LARGE ATTENDANCE. A SUCCESSFUL AND PROFITABLE MEETING. JAMES R. MACCOLL, THIS YEAR'S MEDALIST. RESOLUTIONS IN FAVOR OF THE TARIFF COTTON SCHEDULE PROPOSED BY SENATE FINANCE COMMITTEE, AND AGAINST A HOSTILE ATTITUDE OF STATE LEGISLATURES TOWARD RAILROADS.

The annual meeting of the National Association of Cotton Manufacturers was held at Talbot Hall, Mechanics Fair Building, Huntington Ave., Boston, Mass., Wednesday and Thursday, April 28 and 29.

This was the 86th meeting of this association, which was fundamentally established in 1854 at the Hampden County Cotton Spinners' Association, which, outgrowing the local limitations suggested by its name, became in 1865 the New England Cotton Manufacturers' Association, and like reasons caused the change to be made to the present name in 1906. It was incorporated in 1894.

There were present at the meeting between 200 and 250 members and guests, making it one of the most successful conventions in point of attendance ever held by the association.

This year, for the first time, an exhibition of cotton machinery, mill supplies and general textile products, has been held as a supplementary feature of the convention.

Members came from all parts of the country where cotton spinning and weaving are carried on, being especially drawn by the attractive machinery exhibition to which special attention is given elsewhere in this issue.

The convention fulfilled all of its promises of being a particularly interesting one from the character of the papers read and the discussion that they called forth. The questions that arose included the matter of cancellation in the sale of goods, now a subject in which all mill men and merchants agree as to the principle involved, but who have no concerted plan for putting it into practical operation. Another subject of special interest was the second report of the committee on "Standard Specifications for Staple Gray Goods," which received studious attention by the committee having the matter in charge.

The association medal was awarded to James R. MacColl, treasurer of the Lorraine Manufacturing Co., Pawtucket, R. I., and a former president of the association, for his paper on "The International Relation between Cotton Manufacturers," which embodied a report on the international cotton conference in Paris. Mr. Fish, who made the reward, was himself the recipient of the medal in 1901 and also in 1908. Other recipients have been: 1902, Sidney B. Paine; 1903, William D. Hartshorne; 1904, Daniel Moore Bates; 1905, Henry Grattan Kittredge; 1906, William D. Hartshorne; 1907, Charles B. Burleigh.

The convention was called to order Wednesday morning by the president, Chas. T. Plunkett. The members were welcomed to the Commonwealth of Massachusetts by His Excellency Eben S. Draper, Governor, to whose address Franklin W. Hobbs, vice-president of the association responded, after which the president read his annual address which was followed by papers on the "Importance of Outside Conditions," by Col. Albert Clarke, secretary of Home Market Club of Boston, and on "Conservation" by Prof. Geo. S. Swain, Boston.

The second session of the first day's meeting was taken up with the reading and discussion of the following papers: "Reasonable Legislation Affecting Child Labor," by Lewis W. Parker, Greenville, S. C.; "Additional Top Strippers on Revolving Flat Cards," by William Hayes, Auburn, Me.; "Improvements in Lighting Large Textile Manufacturing Areas with High Efficiency Units," by A. Thatcher Holbrook, Boston, Mass.; "Transportation for Mill Yards," by Day Baker, Boston, Mass.; "Scientific Methods in Warp Sizing," by J. W. Lindau, New York City.

The morning of the third session (Thursday) was taken up with the consideration of the following papers: "The Cotton Fiber Substance and its Properties," Arthur D. Little, Boston, Mass.; "Second Report of the Committee on Standard Specifications for Staple Gray Goods"; "Semi-Combing," by Elwin H. Rooney, Whitinsville, Mass.; "Care of Commutators," by T. E. Chappell, New York City.

The closing, or fourth, session held in the afternoon of Thursday was devoted to the consideration of the following papers: "The Textile School—Its Scope," by Chas. H. Eames, Lowell, Mass.; "Proper Care of Machinery," by Henry D. Martin, Clinton, Mass.; "Bibliography of the Cotton Manufacture," by C. J. H. Woodbury, Boston, Mass.; "Advantage of Variable Speeds for Ring Frames," by Albert Walton, Boston, Mass.

All the former officers of the association were re-elected, as follows: Chas. T. Plunkett, president; Geo. Otis Draper, and Franklin W. Hobbs, vice-presidents. Directors: (three years) George P. Grant, Jr., Edwin F. Green, and David S. Johnson. C. J. H. Woodbury remains secretary and treasurer.

There were elected to the association, 46 active members and 16 associate members. Prof. A. Lawrence Lowell, president-elect of Harvard University was elected an honorary member.

The committee on resolutions voted the following resolutions:

Resolved, That the National Association of Cotton Manufacturers, in annual session assembled, favors the passage of the cotton schedule substantially as proposed by the finance committee of the senate, believing that it will assist in producing the needed increase in revenue, continue reasonable remuneration to American labor and capital, and encourage the development of the industry which will increase the consumption of American-grown cotton, a large proportion of which is now exported for foreign manufacture.

Resolved, That the secretary send a copy of this resolution to the chairman of the finance committee of the senate, and to the chairman of the ways and means committee of the house of representatives.

Resolved, That the report of the committee on standard specifications for staple gray goods defining allowable variations from nominal specifications of width, count and weight, be adopted and approved by this association, and that the board of governors be given power to act for this

association in accepting any changes deemed necessary and recommended hereafter by the committee.

Resolved, That the report of the committee on standard specifications for staple gray goods, recommending a form of contract sales note for staple gray goods, be adopted and approved by this association, and that the board of governors receive power to act for this association in accepting any changes deemed necessary and recommended hereafter by the committee.

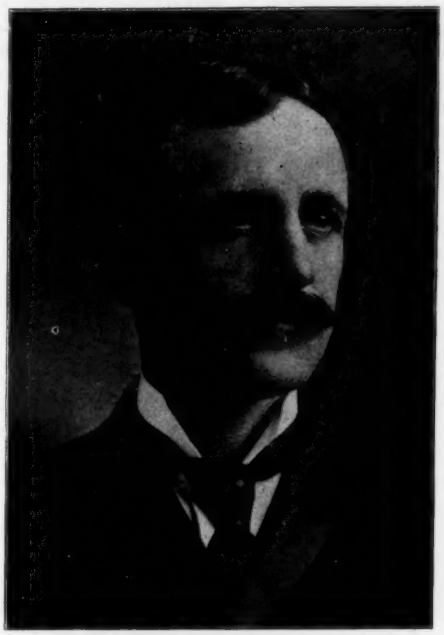
Resolved, That the committee on standard specifications for staple gray goods be continued, or reappointed, with a view to fostering the practical recognition of the specification standards recommended in its report, and the practical use of the sales note form, as well as to recommend any changes to the board of governors that may be found necessary, or advisable, as a result of practical use.

Resolved, That this association heartily endorse the action taken by the board of governors as set forth in the following vote of March, 1909:

Whereas, Extensive improvements in transportation are urgently necessary to meet the demands of future traffic, and a hostile attitude in any of our state legislatures would tend to make railroad managers hesitate to undertake large plans for accelerating freight movement; therefore be it

Resolved, That the board of government of the National Association of Cotton Manufacturers urge legislators to ascertain carefully before adopting new restrictions upon railroads whether they will imperil earnings or interfere with the progressive development of facilities.

Hon. Harvie Jordan, Atlanta, Ga., was invited to address the convention which he did in an earnest plea for improvement in the ginning and baling of cotton, to the effect that enormous waste takes place under existing conditions. He discussed the subject largely from the standpoint of a grower, and is thoroughly aware, he said, of the need of improvements. The opening of the twentieth century offered great advances in all lines, except in the baling and handling of cotton. The same method exists as was in force fifty years ago, with its unpardonable waste and loss through unbusinesslike management. It amounts almost to a crime, he said, yet there is no one place on which to fix the blame. The system built up by the trade in the South has always fought every effort at improvement, while the spinners have been content with mild protests and resolutions for reforms which have never materialized. The gap of estrangement between the growers and the spinners is too wide. The mission of the grower is to provide and the mission of the manufacturer is to convert into a manufactured fabric, and these two interests should, therefore, combine to introduce modern methods demanded by the twentieth century. The inventive genius has made it possible to compress the cotton at the local ginning plant, and a bale of the modern type was exhibited in the room to show what can be done and what the speaker thought should be insisted upon. "I find in talking with the people in this audience," he said, "that there are spinners who do not understand how cotton is handled in the South," and he described how it is done. He showed how the process usually followed destroys the fiber, and how the bale gets to the manufacturer without any shape to it. The new bale will meet all requirements, he said. There will be no need of compressing or recompressing; freight cars can be filled to their capacity and billed through; one car can be made to do the work of six, and the transportation charges are thereby reduced. With the gin compress in general use the entire cotton crop of the South could be handled by 15,000 cars, whereas now it requires 45,000 cars. No bale of cotton should be cut in two or sampled from the time it is made up until it is delivered. The annual loss from leakage and waste in the Fall River district alone amounts to $400,000, and for the entire country it is estimated to be between $12,000,000 and $13,000,000. The freight rate on cotton as now baled is three to five times as high as on any other raw material in the country.



HON. HARVIE JORDAN.

The spinners of the world openly realize the necessity of gin compression and they must meet the growers half way in over-coming many local obstacles in the South. The foreign spinners are taking more interest in this than American producers. For instance, cotton can be sent in the new bale to Manchester, England, at 45 cents less per bale than it can be sent to Providence, R. I., simply because the steamship companies have given reduced rates, while the railroads have not. The speaker predicted that the railroads will have to take recognition of the situation and cut their rates in the near future. A combination of the growers and spinners will bring about the reform, he thought, that all so earnestly desired. The spinners are as vitally concerned as the growers.

There was no long discussion on Mr. Jordan's address, but ex-president James R. MacColl said that the movement was going in the right direction, and he for one was glad to welcome some definite results along lines of improvement. The difficulty is, he thought, that the individual planters could not put in compresses that would handle the cotton properly; yet the new method would enable the growers to pack the goods better, and in that way would secure better prices, the same as the manufacturers do by improving their manufactures. He was sorry that the manufacturers were willing to pay more if they got the cotton in a better condition. President Plunkett said that he thought Mr. MacColl voiced the sentiment of the whole convention in

this respect. It looks now, he said, as if we were on the road to advance.

All reports of the papers given herewith are in abstract only.

President's Address.

CHARLES T. PLUNKETT.

The abundance and cheapness of loanable funds, the substantial reinforcement of mercantile credits, the absence of accumulated stocks, the extraordinary distribution of wealth in every part of the country, renovated and remodelled plants all portend an era of prosperity for employer and employee with which congressional action is unlikely to interfere.

PRESIDENT C. T. PLUNKETT.

The tide of immigration again attracts the attention of publicists who urge as its significance the assured demand of quickening industry. As quiet and constant as the outward flow, when the paralyzing effects of financial panic disturbed American railways and work shops, is the incoming current of hundreds of thousands of human beings, whose knowledge of the world's best field for service, has weaned them from fatherland, perhaps this time to become American citizens.

There is every promise that accelerated consumption of cotton by old, and augmented requirements of several million new spindles, will demand an equally large crop in 1909.

Of the perennial suggestions issuing from all spinners' associations regarding the tare on the American bale and the inadequacy of the Exchange contracts, the stereotyped phrases may still be used. There is, however, a meritorious recommendation of the Federation of Master Cotton Spinners made in March, known as the "net weight contract" which is worthy of our consideration though particularly adapted to export shipments. If the adoption of this contract does lead to "improved methods of baling cotton as was recommended by the Atlanta conference," then will it have accomplished one of the most beneficent acts of the century to grower, carrier, banker, merchant and manufacturer.

The association has continued its vigorous action on legislation by the Federal Government to stop this forest waste at the headwaters of rivers flowing into the Atlantic Ocean. The measure has passed the house, but too late for action by the senate which has already voted three times in favor of the measure, but it is expected at a later session that this important measure will become a law.

The board of government has passed a resolution urging that in view of the extensive improvements in transportation facilities which are urgently required, that all legislative bodies should refrain from restrictions which would interfere with the development of such improvements.

Conservation.

PROF. GEORGE F. SWAIN.

The problem of conserving our national resources arose partly from the increasing price and scarcity of timber and the investigations made by the Department of Forestry, and partly from the recent agitation with reference to inland water ways and the development of transportation in general.

The natural resources which we have been wasting so recklessly and which it is so necessary to conserve, are generally considered to be four in number, namely, the forests, the waters, the lands and the minerals.

A man may have a right to waste, or to use in any way he pleases, property which he himself has accumulated, but he certainly has no right to waste the resources which God has given us, and which belong as much to our successors as to ourselves.

With reference to the waters, these constitute a resource more permanent and inexhaustible than the others. Whatever men may do, rain will continue to fall upon the surface of the earth, but it is not the less important to conserve these waters, and to take such precautions as will allow of their utilization to the fullest extent. The statements which have been made with reference to the exhaustion of our fuel supplies clearly indicate that in the years to come water-power will become more and more important as a national asset. Indeed, as the fuel supplies approach exhaustion, it is probable that our streams will be utilized for power to the greatest practicable extent. In this utilization it is of great importance that extremes of flow should be reduced as much as possible, so that the waste of water in floods may be made a minimum.

The regularity of the flow of streams may be increased by two means, first, the construction of reservoirs, and second by the preservation of the forests. The second agency available for conserving the flow of streams consists in the preservation of the forests. In this respect it is a source of great satisfaction to those of us who believe in the value of the forests, that this Association has taken so wise and far-seeing a position in advocating the passage of some bill providing for the acquirement by the general government of forest reserves upon the mountain

slopes. No other organization of power users made so strong or effective an impression at the recent Conservation meetings.

There has recently been considerable discussion as to the real value of forests in regulating the flow of streams. There are many circumstances which affect the flow of streams and their regularity. Chief among these, aside from natural or artificial reservoirs, are the amount of annual rainfall and its distribution throughout the year. The amount of annual rainfall varies from year to year, being in some years nearly double what it is in others. Its distribution throughout the season also varies, and in some years there are enormously heavy storms while in other years an equal amount of rain may come more gradually.

Extremes of flow, whether great droughts or heavy freshets, which occur only at long intervals, perhaps once in a generation, are generally due to exceptional meteorological conditions, either exceptionally heavy rains coming at a time, perhaps, when the ground is frozen, the result being a great flood, or an extreme and long continued drought, such as occurred last summer. These meteorological influences are so strong that they mask the effect of the forests so far as extremes of flow are concerned. So far as a casual scrutiny of the records of flow indicate anything, our New England streams do not appear to be subject to greater floods or to periods of lower water than they were twenty or fifty years ago. Notwithstanding the recent cutting of the timber in the mountain regions, it is very possible that taking a large drainage area like that of the Merrimac River, the percentage of wooded land may not be very much less than it was fifty years ago. The statement, then, that our New England streams are not subject to greater extremes of flow than formerly, must not render us oblivious or uncertain as to the effect of forests. If we could analyze more carefully the records of flow, we might—and very likely should—find that in a true sense the streams are more variable; but such an investigation would be very lengthy and very costly.

The only justification the government has for the purchase of forest reserves is to protect the navigation of streams. In this respect the forests on the mountain slopes are of the greatest value, for it is on these slopes that the erosion is greatest. In the Southern Appalachians the soil is thick, and where unprotected by a forest cover, large quantities of soil are washed into the streams and gradually carried to the sea. In New England the soil is thin, and the effect is of a somewhat different nature. Where the forests are thinned out, the winds uproot and destroy many of the remaining trees and it takes a long time for the growth to be renewed.

Improvements in Lighting Large Textile Manufacturing Areas With High Efficiency Lamps.

A. THATCHER HOLBROOK.

The question of cotton mill lighting has always been a serious one to consider. As the mills have increased in production, so has been rendered necessary the economical distribution of looms and spinning frames, and more and more has the tendency been to outgrow the cramped and narrow quarters of the early mills. Weave sheds comprising an area of an acre in extent are not uncommon, and mills are being constructed at the present time which cover several times these figures.

When Brush developed his system of electric arc lighting, the first great improvement in artificial lighting as applied to the illumination of cotton mills was made. This lamp gave a large volume of light and could be installed to good advantage with considerable satisfaction. The light was bluish white but very unsteady, and the variations in candle power due to the method of feeding were very great.

The development of the incandescent lamp caused a decided move in its favor by the mills. It has, however, been found that this system of illumination, while satisfactory in a measure, has disadvantages, owing to the complexity of its installation and the expense of its up-keep.

These conditions are entirely done away with when a system of large units placed close to the ceiling is installed, and the entire interior illuminated along scientific lines. Under these circumstances the lamps should be placed close to the ceiling, and in such uniform distribution that the light from one lamp will break up the sharp shadows which occur. The most practical lamp for this character of illumination is one which will burn for long periods without renewal, which will give a light of good quality with steadiness, and which will project its rays in a downward direction. These characteristics are to be carefully considered when an installation of this character is made, and the lamp which conforms most nearly to these requirements should be selected.

The use of small units as against large units always shows to the disadvantage of the former in mill work. The illumination given by small units is so small that the lamps must be hung low and are consequently constantly within the range of vision of the operative. As the radius of illumination is proportionate to the amount of light emitted it will be noted that the spaces between lamps has a very low illumination intensity and produces a spotty effect which is undesirable. In the case of large units the intensity of illumination is so great that the lamps are placed entirely outside of the range of vision and diffuse this illumination, so that an equal distribution is obtained of sufficient value to make good work possible. Daylight is diffused in this manner, and where good diffusion is possible freedom from eyestrain will prevail.

The question of matching colors under artificial light is one that has never yet been determined by physicists and it has been found that a combination of colors can be obtained which can be matched under any form of artificial light. The use of special lamps to bring out the abstract colors is no longer absolutely essential, and the lamps which give the colors a pleasing appearance are the ones most acceptable at the present time.

The Mill Yard Transportation Problem.

DAY BAKER.

Not only are the problems of transportation encountered in handling the actual raw material, material in process, and the finished goods, but in the many contingent parts of mill-work there also arises numerous calls for transportation of some character.

Just as the electric street car has solved the problems for passenger transportation in cities, so has the electrically driven power wagon opened the way to a simple freight and delivery system around mill yards. The electric vehicle

for trucking and delivery is purely a mechanical proposition. It is a machine.

Accurate engineering can be applied to the problems of transportation with greater satisfaction with electric vehicles than with any other type. Among the many arguments which should be considered by the mill operators in connection with electric motor vehicle work over horse drawn trucks is the cleanliness in garage and around the yards.

Corn Starch.

J. W. LINDAU.

Up to the time when the manufacturers of corn syrup entered upon the manufacture of mill starch, the textile trade depended for its requirements, almost entirely, upon potato starch imported from European countries. The small starch factories, located in this country satisfied but a small share of the demand. The corn syrup manufacturer, because of his large grind, was able to produce commercial mill starch, at such a low figure, and containing as it does, such great starch value, that it replaced with the improved method of manufacture, to a very large degree, the European product, the manufacture of which has grown into one of our most important products.

The "green starch" is removed from the "tables" and diluted with water until it forms a thin starch milk, which in the case of corn starch, is refined very carefully by a number of well regulated operations. It is then deprived of the bulk of water, and the starch now containing between 40 and 50 per cent. of water, is introduced into drying kilns. It is then put up in the various forms demanded by the trade.

From the powdered starch, the dextrines are made up by a process of calcining; a number of grades being produced, running in color from a pure white to a dark yellow, such as white, canary, and dark dextrine, British gum, etc.

The Cotton Fiber Substance and Its Properties.

ARTHUR D. LITTLE.

Just as the usefulness of a steel rail depends far more upon the essential qualities of steel than upon the particular shape into which the steel is fashioned, so does the industrial value of the cotton fiber find its basis in the properties of cellulose. Let us consider therefore what these properties are and in what relationship cellulose stands to other materials.

Although the cotton fiber appears white in the mass, the cellulose of which it is composed is transparent, the apparent whiteness of the fiber being due to multiple reflection from many surfaces. A film of cellulose is quite as transparent as good glass. Not only is cellulose extraordinarily tough but it is extremely strong. Ordway has shown that single cotton fiber will sustain a weight of 10 grams, a result which proves that an equal section of good cellulose is as strong as good steel. Few men are strong enough to tear a thin film of cellulose once folded. Moisture increases both the suppleness and strength of cellulose, a fact which cotton manufacturers recognize in their attempts to maintain a moist atmosphere within their mills. The experiments of O'Neil seem to indicate that carefully bleached cellulose is somewhat stronger than the more impure form, and this of course is a point of first importance to all finishers of cotton goods.

Despite the great bulk of cotton, the specific gravity of cellulose itself, of which purified cotton may be taken as the type, is 1.5. Dry cellulose is a non-conductor of electricity, else cotton yarn could not be used for braiding wire or paper employed for wrapping cables.

Cellulose is very resistant to most forms of chemical attack. Cellulose structures in the form of mummy cloths, ancient papers and papyri have survived the vicissitudes of thousands of years.

One of the most characteristic properties of cellulose is its enormous capacity for hydration. Under proper conditions it may absorb water until a stiff jelly containing only one per cent. or cellulose results. It is probable that as first laid down by the plant the cellulose exists in this condition of extreme hydration and that as the plant structure or the wall of the particular cell involved ripens, the water is gradually eliminated with the result that the cellulose wall becomes more dense and finally acquires the strength and toughness of the normal cellulose. However, this may be it is well established that both the chemical and physical properties of cellulose vary materially with the source from which the cellulose is derived. From certain points of view these differences are so important as to lead chemists to speak of the celluloses just as they speak of the starches or the sugars as comprising classes of related substances rather than a single sharply differentiated compound. Whether this distinction is justified or not, certain general reactions and relationships may be considered as broadly characterizing cellulose.

Under the action of strong alkalies cellulose is partially gelatinized and undergoes a considerable shrinkage. It acquires at the same time greatly increased strength and takes dyes much more deeply. It is found that if the cotton or other cellulose fiber is strongly stretched while under the action of the alkali it acquires a remarkably silky luster. The development of luster is more marked with long staple cotton like Sea Island or Egyptian and is due to the heavy strain put upon the fiber in the semi-plastic condition induced by the alkali. The broad, twisted, collapsed fiber tube is thus drawn out into a smooth rod with relatively thicker walls which closely approximates the microscopic character of silk. As a result of this discovery the process of mercerizing has nearly revolutionized the manufacture of fine cotton textiles.

Weak acids slowly attack cellulose, converting it to a very friable product known as hydrocellulose. Upon this fact depends the well-known process of corbonizing wool and shoddy to remove burrs or cotton fibers. The wool is saturated with weak mineral acid or an acid salt like chloride of alumina and then dried, with the result that any vegetable fiber is rendered so brittle as to readily dust out.

Oxidizing agents as solutions of bleaching powder, permanganate of potash and so on, are without action upon cellulose in dilute solution at temperatures below 100 degrees Farenheit when properly controlled. If the temperature is raised or the solution allowed to become concentrated the cellulose is attacked with formation of the white and brittle oxycellulose. This material has a remarkable power of fixing certain dyes and this fact is utilized in bleaching to increase the dyeing power of cotton yarns by the superficial formation of oxycellulose. Oxycellulose has a remarkable and unexplained power of attracting and fixing certain salts from extremely dilute solutions. Fibers superficially converted to oxycellulose will remove vanadium

from solutions containing only one part of the element in one trillion. Oxycellulose has also a powerful attraction for basic dyes though not for those of acid character.

In its general chemical relationships cellulose belongs to the great group of substances of vegetable origin known as the carbohydrates. It is thus directly related to the starches and the sugars. From these materials alcohols are readily formed as they may easily be formed from cellulose itself. Indeed in many of its relationships cellulose directly suggests the alcohols and like them is readily converted into ethers through reaction with certain acids.

Committee on Standard Specifications for Staple Gray Goods.

SECOND REPORT.

[The first report of this committee was presented at the Saratoga meeting last September. Subsequent to making its first report, the committee decided definitely to define limits of variation only on the three points, or specifications, of width, count and weight as given in the April number of COTTON, page 213.]

Data received by the committee indicate that more than 95 per cent. of all goods made in this country are 40 inches wide, and under, and, therefore, that variations should be defined that will be most applicable and correct for goods 40 inches in width, and under, and if, in any special cases, they are found impracticable for wider goods, such cases would naturally be considered as special, and not subject to the rules on this point. Moreover, for the great bulk of goods 40 inches wide, and under, the actual fractional limitations adopted have been found much nearer the truth than any percentage limitations, and, at the same time more practical for use by manufacturer and consumer.

In connection with count, we have found that, in the case of most of the staple constructions, definite variations are much nearer the truth than percentage limits, and would be much more satisfactory to use in practice. This seems to be true of goods of both high count and low count, made of fine or coarse yarn, with the exception of sateens.

Allowable variations in weight have been expressed in percentages, which is very clearly the correct basis, in preference to definite fractional differences of yards per pound, or ounces per yard. As far as can be determined, foreign trade customs correspond closely to our weight recommendation. Differences in weight due to ordinary changes in the humidity of the atmosphere are very large, and may be estimated at a total of 6 per cent. between minimum and maximum weights. It would clearly be impracticable, under present conditions, to define variation limits due to that cause. We have, therefore, called attention to the fact that, for the purposes covered by our report on weight, variation limits apply to goods weighed under average cloth room conditions, which, we believe, agree closely with the average atmospheric conditions of consumers' warehouses and factories, and which we estimate would approximate a temperature of 70 degrees Fahrenheit, and a humidity of 70 per cent.

Your committee, in considering a standard form of contract for cotton goods, has thought best, for the time being, to limit the scope of our work on this point to a form of contract sale note to cover the ordinary transactions in staple gray goods.

There are three general causes of trouble and litigation in the present methods employed in buying and selling cotton goods, namely:

1. A failure to clearly express and define the practical features of the agreement.

2. A failure to make clear and binding the legal features of the agreement.

3. A great lack of uniformity in the methods and sales note forms employed.

[In the form of contract sale note recommended by the committee appear the following clauses:

"Unless otherwise specified, the title to the goods sold passes to the buyer (subject to the right of stoppage *in transitu*) when delivered F. O. B. to carrier consigned to buyer and thereafter goods are at buyer's risk. Title to goods consigned to seller's order does not pass until delivery of indorsed bill of lading or of goods. If goods are to be held or if buyer refuses shipping instructions, title will pass on seller separating the goods, and holding them subject to buyer's order, invoice to follow by due course of mail. Sixty days free storage allowed on goods so held, the same to be at buyer's risk but to be covered by fire insurance effected by seller in reputable companies.

"The buyer can not reject the goods for delay in delivery unless he notifies seller within seven days from receipt of bill of lading, or of invoice if goods are to be held; and he can not reject the goods for defects in quality or other defaults if he cuts or converts them, or unless he notifies seller within thirty days from receipt by him or at finishing works of goods not held or within thirty days after expiration of period of free storage if goods are invoiced and held. Loss of right to reject does not deprive the buyer of his right to claim damages, if any, but no recovery shall be had on any claim not made within one year from receipt of goods or beginning of period of free storage.

"If the production of the seller shall be curtailed during the time above named by labor controversies or unavoidable casualties beyond his control, the deliveries shall be made, and accepted in proportion to the production.

"When contract calls for delivery in installments, the buyer can not cancel the contract for any default in any one or more instalments not amounting to a substantial breach of contract."]

Semi-Combing.

ELWIN HOLBROOK ROONEY.

In presenting a brief paper on the question of semi-combing, it is, perhaps, proper to compare it with the system of double carding. The results of a test between the two systems would show for the semi-combed cotton a superior quality and increased production, without greater loss in waste and, where a better class of work is not required, a lower grade of cotton and shorter staple might be used.

In the beginning, the object of combing was to remove the short fibers from staple cotton, thus enabling the spinner to draw equal lengths of fiber into a fine, round, even and strong thread. In the longest staples of cotton, there is a variation in the lengths of the fiber of from 15 to 25 per cent., depending upon the quality and grade; and by doing away with this variation, it was always an easy matter (if the cotton was properly drawn, and correctly drafted), to get an even yarn. In the last fifteen to twenty years, however, competition has compelled the spinner to use shorter staple cotton and still demands equally as good

yarns as were produced in previous years by the use of the longer staple cotton. The problem of the machine builder has been to perfect the comber to enable the spinner to accomplish the results demanded by the trade. Additional classes of yarn have come to require combed cotton; one of which, hosiery yarn, it spun from cotton ranging in staple from seven-eights of an inch to one and one-eighth inches and, of late years, has to be combed almost exclusively, for two reasons: (1) it must be well cleaned, and (2) it must be round, even and a lofty thread. To make this class of work profitable, it became necessary to increase the production of the comber. This has been successfully accomplished, and to-day a great many mills are using combers in connection with hosiery yarns with marked success.

A number of years ago, perhaps it is fair to say, in the early days of cotton manufacturing in this country, when the old American top flat card was used, double carding was the practice in most cases, and, at the time of the introduction of the revolving flat card, one process of carding was advocated by all builders as adequate to produce work equal to that obtained from the use of the old American card on the double carding system. A great many spinners doubted the feasibility of this and to-day, we find there is a greater demand for efficiency in weaving and spinning, as well as in the carding department. Futhermore, as the price of labor continues to advance, the manufacturer must, of necessity, increase his production sufficiently to offset the enlarged cost of manufacture.

I, therefore, present to you the question of semi-combing or, in other words, a method of obtaining a high production; namely, one thousand pounds per week of semi-combed work, with the percentage of noils approximately eight per cent. It is our claim that in the process of semi-combing, which includes carding and combing, the loss in waste is not greater than in the method of double carding. By the former process, the spinner is enabled to increase the production of his card from 25 to 50 per cent. above what he could produce in double carding and the result is that, by the process of combing instead of carding, he removes the shorter fibers from his cotton, (which he could not do by the use of the second process of carding) arriving at a finer, rounder, stronger thread, which can be spun with less twist, giving him a greater production with the same break; or if spun with the same twist, I claim he will get an increased breaking strength of from ten to fifteen per cent. on No. 36's yarn.

To sum up, we derive a benefit in breaking strength in spinning, by semi-combing, of 13 per cent., which reduces the breakage of ends in spinning 74 per cent. For the purpose of comparison of breakage in warp and filling in weaving, we have taken five consecutive full working days in each process, which shows for the semi-combing 12 per cent. less breakage of ends in the warp, and in the filling a reduction in breakage of 85 per cent., while the cop waste was reduced 96 per cent.

Experiments have proved to us that single carding on the revolving flat cards is equal to double carding on the old American cards; but double carding on the revolving flat cards proved that the finished product was of a higher grade, because the cloth woven was much cleaner, with approximately the same loss in waste as on the old system of double carding; while, in the last experiment, semi-combing, with practically the same loss in waste, whether double carding on revolving flat cards or on the old American cards, or single carding on the revolving flat cards is considered, the breaking strength increased 7.38 pounds, and the cleanliness of the finished product was marked.

In a mill of 60,000 spindles, spinning No. 36's warp and No. 48's filling, the product would be approximately 55,450 pounds of yarn per week, and it would require, for the purpose of double carding this product 90 breaker cards, producing 765 pounds each per week, 10 doublers, and 110 finisher cards, producing 600 pounds, the total amount of machinery occupying 23,800 square feet, inclusive of proper working alleys, and consuming 275 horse-power, with the labor of 13 card strippers at $117.00, 8 card grinders at $84.00, 8 card boys at $48.00, 5 doublers at $35.00, and 3 railway or drawing tenders at $18.00. Labor cost annually $15,704.00. On the other hand, a mill producing the same number of pounds of semi-combed yarn would require 75 cards producing 925 pounds, 60 combers producing 1,000 pounds, 10 sliver and 10 ribbon lap machines, occupying 19,000 square feet, including proper working alleys, and consuming 160 horse-power, requiring the services of 5 card strippers at $45.00, 3 card grinders at $35.00, 3 card boys at $18.00, 8 lap machine boys at $60.00, 10 comber tenders at $80.00, and 2 fixers at $30.00. Labor cost annually $13,936.00. The first cost of equipment, therefore, of a semi-combed mill is parallel with that of the mill for double carding; the floor space saved is approximately 4,800 square feet, or about 20 per cent. The saving in power is 115 horse-power or about 40 per cent., and the annual saving in labor cost is about $1,768.00.

The result of the operation of a mill such as the above would be, as demonstrated by practical tests, the manufactured goods would be of a higher quality with the same grade of cotton; or, if an equal yarn only were desired, a much lower grade cotton or shorter staple might be used. A sixteenth of an inch saving in the length of the staple, or from two to three grades lower in the cotton would lessen the cost of the raw stock 75 points per pound. This would amount, in a mill with the production stated, to $487.50 per week, or the handsome total, annually, of $25,350.00.

The reason for this is that, in combing, the fiber is straightened out so much more than in double carding that the spinner is enabled to use a shorter staple, and yet obtain as fine a yarn as in double carding; whereas, should the same staple and grade of raw stock be used, the finished product would be far superior, and the work would run so much better in fly frames, spinning and weaving, that it would not only increase the production of the several machines, but would also make it feasible for the operators to attend a greater number, which would lessen to an appreciable extent the cost of production.

The Proper Care of Machinery.

HENRY D. MARTIN.

Machinery in charge of intelligent and skilled men should never be allowed to wear out for want of oiling; for want of proper adjusting; proper cleaning; proper speeding; or proper handling by the operatives, etc. Machinery deteriorates in efficiency and value because it becomes too old to compete with modern improved machinery. However, old machinery that has had good care, kept in first class repair, and latest improved mechanisms applied, when possible, from time to time, will give a long chase before becoming wholly unprofitable to operate. Although

the old equipment may be in good running order, it is well too, not only to watch the repair account, but it is well to consider what the loss is in operating old machinery, and compare the figures with the much greater advantage of replacing same with modern machinery altogether. There comes a time when it is folly to operate an old machine when a new one would rapidly pay for itself and soon be giving dividends that the old equipment could never bring. It is false economy to repair a machine beyond the economical range.

Bibliography of the Cotton Manufacture.

C. J. H. WOODBURY.

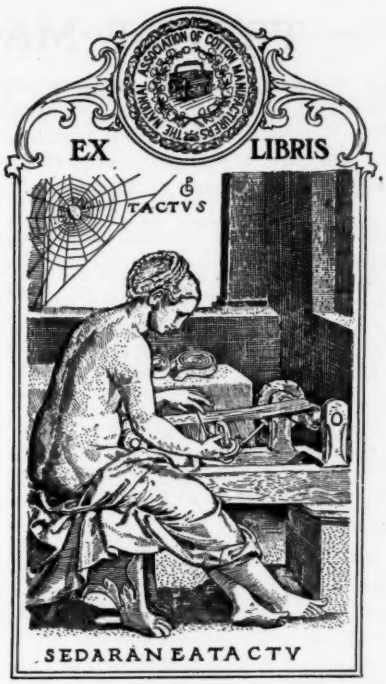
The association is constantly receiving requests for information upon books relating to the manufacture of cotton or to its tributary subjects, many of these inquiries being of importance to the interests of such members.

SECRETARY C. J. H. WOODBURY.

The card catalogue of the "transactions" contains about 25,000 references, but beyond this there does not appear to be any bibliography upon the subject, notwithstanding the importance of the industry, and it has been generally difficult and frequently impossible to either answer these inquiries or to give any reference where this information can be obtained.

It was decided that before the Association could take any steps towards the systematic formation of a library, it would be necessary to ascertain what books were available from which to make a selection and the income from the bequest of George W. Weeks was applied to this purpose.

A circular letter was issued to the members and to libraries believed to have collections on textiles, asking for titles of such books with names of authors, publishers, locations and dates. The response has been most cordial, bringing, it is estimated, over 12,000 titles in reply, including many references to addresses and articles in magazines containing some of the most valuable contributions



The scene is a copy of THE WEAVER, by George Pencz. (Nuremburg 1530,) and is the earliest known engraving on a textile subject.

The motto, "sed aranea tactu," (but the spider in delicacy of touch) is the last portion of a Latin couplet, parts of which were used as titles to his five engravings on the senses.

"Truxa per auditum, link visu, milvus odore, simia nos superat gustu, sed aranea tactu."

"Wild animals excel us in hearing, the lynx in sight, the vulture in smell, the monkey in taste, but the spider in delicacy of touch."

to the cotton industry, which could not otherwise have been found without extensive search.

Many private libraries far exceed the collections of any of the textile schools, and this fact is mentioned to call attention to the desirability of providing suitable textile libraries for such institutions, as it is frequently only through the privileges of libraries that the state of any branch of the textile art can be learned and useless labor of duplication avoided.

The public frequently buy goods without inquiry as to whether they have been dyed in such a manner as to make them suitable for the use to which they are to be put. If purchasers exacted a guarantee of fastness from the retailer, the latter would require one in his turn from the wholesaler, and he from the manufacturer or dyer.

The manufacturer who knows for what purposes he intends the goods he makes should know enough about dyeing to give the necessary directions to the dyer, and to know what can be reasonably expected.

When small amounts of dyes are used for shading purposes in baths containing a principal dye in much larger quantity, it is an excellent plan to select the subordinate dyes from among those which are rather faster than the main dye, and not the other way about, as is usually done, unfortunately.

TEXTILE MACHINERY EXHIBITS.

S. F. Bowser & Company, Fort Wayne, Ind., had quite an extensive exhibit including ten different styles of outfits for handling oils.

H. W. Butterworth & Sons Co., Philadelphia, made an attractive exhibit of a Simpson winding machine.

The Universal Winding Co., 95 South St., Boston, Mass., made an extensive exhibit of its machines as follows:

Two gangs, No. 90, one equipped for winding pin cops and one for bobbins. This make of winder is built in gangs of twenty spindles each, and is especially designed for simplicity and convenience of operation. It is a compact machine and can be run at a high speed, giving a maximum production in a minimum floor space. It is self oiling, all gears and engaging parts being enclosed in oil-tight, dust and lint-proof compartments, thereby reducing wear and up-keep cost to a minimum.

One gang, No. 50 winding machine for coning, tubing and doubling. Like No. 90, this machine is self-oiling with all of its gears, etc., protected in the same manner.

One single No. 6 winding machine for twines and small cords in packages 8 inches in length.

One No. 7 winding machine for heavy cord, weighing approximately 50 pounds to the package.

The Nos. 50 and 90 machines were in operation all through the exhibition, and in addition to these the company made a considerable display of packages wound on Universal machines, which it may be stated are instruments of precision.

The Bell Pure Air & Cooling Co., (The Griscom-Spencer Co., New York City,) made an exhibit of one of its humidifiers, type C, for textile mill use. It is of the evaporative type, consisting of a copper case in which are arranged sheets of moistened cloth, and a fan which propels the air of the mill through the case and past the sheets. Evaporation from the wet surfaces provides the necessary humidity to make up the deficiency. The net result is a self-regulated humidifying effect, providing a proper maximum under all conditions, greatly promoting the smooth working of textile operations and improving the condition of the materials. The humidifier exhibited was of the electrically driven type, but belt driven machines are also provided where preferred.

The Griscom-Spencer Co., 90 West St., New York City, made an exhibit of its Reilly feed water heater, which exhibit occupied the same space with that of the Bell Pure Air & Cooling Co. This heater is one in which the heating tubes are of seamless drawn copper, coiled spirally, and secured to the head connection by ground union joints. A large door in the shell of each heater gives access to the interior, making it possible to inspect or remove coils at any time without disturbing the pipe connections. This heater for land use is a development of the Reilly heater, long and favorably known to the shipping trade through its use over a period of twenty years on ocean-going vessels of all sizes, and for all purposes. The various features of excellence of the marine heater have been retained, and modifications made to adapt the construction to use in large stationary steam plants.

G. M. Parks Company, Fitchburg, Mass., made an exhibit of its turbo-humidifier showing one or two of its heads in operation. There was shown a small compressor to demonstrate the method of the humidifier for obtaining the air under pressure and also to be used in connection with the device for the cleaning of rooms, looms and machinery by compressed air.

Cell Drier Machine Co., Taunton, Mass., had an exhibit of its two horizontal type of sell driers each having thirty cells, which, it is said, equals in drying capacity a cylinder drier having 60 23-inch diameter cylinders. The machine on exhibit was about 11 feet long, doing the work, it is claimed, of a cylinder machine 70 feet long.

Thomas Leyland & Co., 60 India St., Boston, Mass., made an exhibit of their imported Mycock regulating cloth expander, an imported scutcher, and sewing machines for textile work, and other devices. The expander is used on dry cans, calenders and water mangles.

The Westinghouse Electric & Manufacturing Co., Pittsburg, Pa., made a practical exhibit of its electric motors and apparatus especially designed for the operation of textile machinery. The exhibit illustrated the satisfactory application of motor drive to this class of work, as well as the close attention which the Westinghouse engineers have given the development of an extensive and specialized line of apparatus designed for the exacting needs of this service. Spinning frame motors were shown, complete and in sections, for the close inspection of their parts, and a similar display was made of loom motors. The Westinghouse type F motor, which is applicable especially to group drives, was also exhibited in several larger sizes. All of the apparatus was supplied with a full equipment of control and protectives devices, including spinning frame and loom switches and circuit breakers.

The Holtzer-Cabot Electric Co., Brookline, Mass., made an exhibit of samples of its various lines of motors for direct and alternating current, also generators for operating looms, loud ringing bells, and signals of various kinds.

The C. J. Root Co., Bristol, Conn., exhibited some of its automatic counting machines which are used very largely in the textile industry for the picks or yardage on looms, and for measuring yardage on loopers, folders, padding machines, printing machines, etc.

The Textile Finishing Machinery Co., Providence, R. I., made an exhibit of an Atherton spinning machine, which is the latest improvement in machines of this kind for spinning flax and other fibers. This company also made an exhibit of a standard 3-roll calender, and a few specialties, such as a drying machine calender, copper deposited roll, etc.

The Draper Co., Hopedale, Mass., had an extensive and most attractive exhibit of its Northrop looms, I Model spoolers, two beam warpers, a ball warper, a Moscrop single thread yarn testing machine, and samples of small improvements, including centrifugal clutch spindles, loom temples, "mirror" spinning rings and a Duckworth traveler magazine. The latter device is shown in our "New Machinery Department" in this issue. The Northrop loom that was exhibited was operated on very fine numbers,—80's warp and 120's cop filling,—demonstrating that this loom is capable of running on fine goods as well as on coarse. This machine has many advantages, among them may be mentioned those of saving weavers' wages; enabling mills to keep up production when there is a shortage of help; capacity of being operated overtime in the absence of weavers, and thus materially increasing the output; and in requiring less experienced weavers than common looms. The spooler had a separate traveling belt on each side, new traverse motion, which does away with lifting rods, and the Rhoades' new patent bobbin holders that go with this construction. The warpers included an "I" model machine, which will take beams with 32-inch heads, which is desirable in running coarse yarns. The warper for various fine yarns carried a very light beam, made for the finest warping that is done. The balling machine has a measuring device on a floor pedestal, which insures accurate measurement. The single thread testing machine is a very ingenious one, made under the Moscrop patent, which has had a marked success in England. This is a new automatic machine which takes six bobbins or cops of yarns at one time, automatically siezing the yarn ends winds off a certain length, and then breaks it through a spring pull, the breakage strength being directly registered on diagram paper.

The Chernack Circular Loom Co., Boston, Mass., exhibited its circular loom which is made on an entirely new principle, with two dominating parts, one relating to the shuttle and the other to the mechanism for opening the shed for the shuttle to pass through. The shuttles are propelled by vertical slides moving up and down and carrying warp threads. The loom is adapted to weave different kinds of special fabrics, such as fire hose, garden hose, flexible electric conduits, as well as to cover electric cables for insulating purposes. For the production of the different fabrics named different sizes of machines are employed.

The entire center of the exhibition hall was occupied by a very large exhibit of power and electrical machinery made by the Allis-Chalmers Company, of Milwaukee, the principal feature of which consisted of a motor generator set of 100 horse-power, equivalent to 75 kilowatts capacity, which was in a continuous operation during the period of the show. It took direct current, generated in the power-house attached to the building, and converted it into alternating current, which was used to run a large number of motors driving machinery in other exhibits. Most of these motors were furnished by this company, including twelve to fourteen loom motors developed especially for use in textile mills. A placard on one of these motors mentioned that four-hundred were already in service in the mill of the Royal Weaving Company at Pawtucket, R. I., and that five-hundred additional machines of the same type had been ordered for the same plant.

Another feature of Allis-Chalmers Company's exhibit was a special textile switch which has recently been brought out.

Considerable attention was also attracted by a motor driven air compressor, mounted on a truck 26 inches wide, the equipment having been designed particularly with reference to service in mills having narrow aisles between rows of looms, and is intended to furnish compressed air for cleaning.

The exhibit further included the company's standard induction motors for alternating current, its new type "K" motors, for direct current, a line of lighting transformers, made in sizes from 6-10 to 50 K. V. A., a balancer for multiple voltage system, used in establishments, such as prints works, where considerable variation in speed is required, and other power and electrical apparatus.

The exhibit was in charge of Meldon H. Merrill, sales engineer for the textile industries, and C. A. Tupper, manager of publications and advertising, assisted by salesmen from the company's Boston district office, situated at No. 50 Congress Street.

The Textile Machinery Co., Boston, Mass., exhibited its Dunn flyer which is constructed on the principle of having the presser hung so as to move around a horizontal axis in a radial vertical plane, and permitting a flyer body to be made of a semi-steel casting, whose arms are short, thus producing a flyer that is lighter and stiffer and one that always is in balance. The arms being short and stiff, they can not be bent or twisted unless done so purposely. This feature overcomes all spreading of the arms at any practical speed, also there is no danger of the arms scraping upon a full bobbin, which is not only injurious to the roving, but also puts extra strain upon the frame at that time.

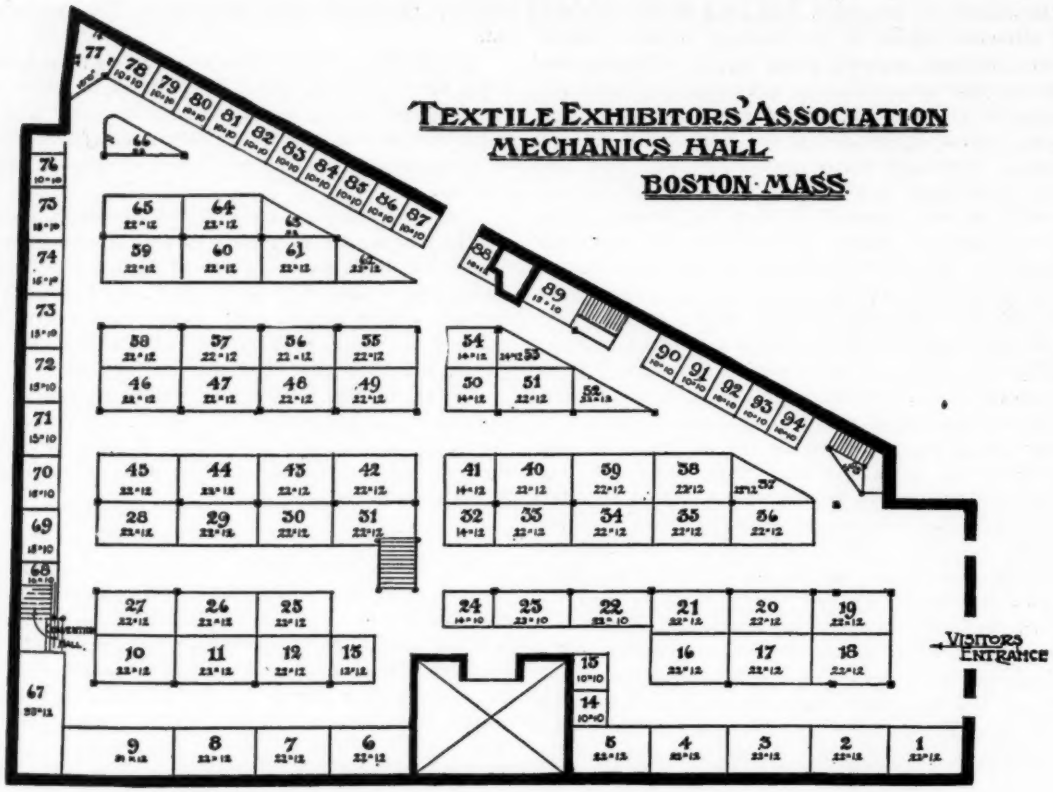
The Oakley Steel Foundry Co., Millbury, Mass., represented by W. E. Oakley, exhibited genuine crucible steel castings as follows: In carbon steel, nickel steel, nickel chrome, nickel vanadium and titanium.

The American No-Slip Pulley Cement Co., was represented by Arthur P. Hall. The object of this company's cement is to permanently prevent the slipping of belts.

The West Disinfecting Co., Inc., New York, with New England offices at 128-132 Washington St., North, Boston, Mass., had an attractive exhibit in charge of T. F. Kelley, manager of the New England office, assisted by Walter B. Page one of the company's salesmen. A fine display of disinfectants and liquid soaps, the product of this concern was displayed.

A handsome display of alcohol-copal varnishes and Farrington floor finish was made by the Farrington Company. George Otis Draper is president of the concern, Harold C. Hansen, treasurer, and William L. Frisbie, sales manager. This concern's finishes are used by many makers of bobbins and spools.

The Macrodi Fiber Co., Woonsocket, R. I., had a complete line of their fiber spools and reels. S. T. Packard of the company says that business is very good.



LIST OF EXHIBITORS.

SPACE NO.

1.....Lowell Institute for Industrial Foremen, M. I. T.
2.....Lowell Institute for Industrial Foremen, M. I. T.
2 (b).....Spaulding Perkins Co., Rochester, N. H.
2 (a).....A. W. Ellis Advertising Agency, 10 High St., Boston.
2 (c).....Edge Moor Safety Boiler, Wilmington, Del.
3-4.....Studebaker Bros., 1020 Boylston St., Boston, Mass.
.....Textile World Record, Lord & Nagle.
6 (a).....Macrodi Fibre Co., Woonsocket, R. I.
6 (b).....Textile Manufacturers Journal, 184 Summer St., Boston.
7.....Heine Safety Boiler Works, 176 Federal St., Boston.
8.....Whitin Machine Works, Whitinsville, Mass.
9.....Whitin Machine Works, Whitinsville, Mass.
10.....Cell Drier Machine Co., Taunton, Mass.
11.....Cell Drier Machine Co., Taunton, Mass.
12.....Fibre & Fabric, 127 Federal St., Boston.
13.....Fibre & Fabric, 127 Federal St., Boston.
14.....Commercial Bulletin, 41 India St., Boston.
15.....Textile Machinery Co., 60 India St., Boston.
16.....Lowell Textile School, Lowell, Mass.
17 (14x12).New York Revolving Portable Elevator Co., 450 Princeton Ave., Jersey City, N. J.
17 (b).....Crocker-Wheeler Co., Ampere, N. J.
18.....Crocker-Wheeler Co., Ampere, N. J.
19.....General Vehicle Co., 84 State St., Boston.
20.....Wm. Sellers & Co., Inc., 1600 Hamilton St., Philadelphia, Pa.
21.....Carrier Air Conditioning Co., 39 Courtlandt St., New York City, N. Y.
22.....American Warp Drawing Machine Co., 289 A St., Boston.
23.....American Warp Drawing Machine Co., 289 A St., Boston.
24.....American Warp Drawing Machine Co., 289 A St., Boston.
25.....S. F. Bowser Co., 255 Atlantic Ave., Boston.
26.....C. M. Parks & Co., Fitchburg, Mass.
27.....Brown & Wales Co., 69 Purchase St., Boston.
28.....White Co., 320 Newbury St., Boston.
29.....Grant Nail & Supply Co., 47 High St., Boston.
30.....The Draper Co., Hopedale, Mass.
31.....The Draper Co., Hopedale, Mass.
32.....Allis-Chalmers Co., 50 Congress St., Boston.
33.....Allis-Chalmers Co., 50 Congress St., Boston.
34.....Coldwell-Gildard Co., Fall River, Mass.
35.....Howard Bros. Manufacturing Co., Vine St., Worcester, Mass.
36.....Universal Winding Co., 95 South St., Boston.
37.....Universal Winding Co., 95 South St., Boston.
38.....Universal Winding Co., 95 South St., Boston.
39.....Allis-Chalmers Co., 50 Congress St., Boston.
40.....Allis-Chalmers Co., 50 Congress St., Boston.
41.....Allis-Chalmers Co., Congress St., Boston.
42.....Dodge Manufacturing Co., 137 Purchase St., Boston.
43.....The Textile Finishing Machinery Co., Exchange St., Providence, R. I.
44.....The Stafford Co., Readville, Mass.
45.....The Stafford Co., Readville, Mass.
46.....Crane Co., 401 Atlantic Ave., Boston.
47.....Thomas Leyland & Co., 60 India St., Boston.
48.....Cotton Publishing Co., Atlanta, Ga.
49.....Westinghouse Electric & Manufacturing Co., Pittsburg, Pa.
50.....Chernack Circular Loom Co., 620 Tremont Building, Boston.
51.....Chernack Circular Loom Co., 620 Tremont Building, Boston.
52.....United Shoe Machinery Co., Kingston St., Boston.
53.....Kilburn, Lincoln & Co., Fall River, Mass.
54.....Kilburn, Lincoln & Co., Fall River, Mass.
55.....Cooper-Hewitt Electric Co., 161 Summer St., Boston.
56.....Cooper-Hewitt Electric Co., 161 Summer St., Boston.
57.....Harriman Engine Co., 303 Exchange Building, Boston.
.....Sub-Target Gun Co., Boston.
62.....American No-Slip Cement Co., Roslindale, Mass.
67.....Whitin Machine Works, Whitinsville, Mass.
69.....Roto Co., Hartford, Conn.
69 (b).....New England Engineer, 12 Pearl St., Boston.
70.....New England Engineer, 12 Pearl St., Boston.
71.....American Steam Gage Co., 205 Camden St., Boston.
72.....Copper Ore Paint Co. (T. C. Leavens, 92 State St., Boston.)
73.....A. S. Morss (Pyrene); Jenkins Bros., 210 Commercial St., Boston.
74 (a).....E. H. Jacobs Manufacturing Co., Danielson, Conn.

75 (b).....Marine Motor Manufacturing Co., 5 Park Sq., Boston.
80.....Carbolineum Wood Preserving Co., 349 Broadway, New York.
82.....Rhode Island Coal Co., 45 Milk St., Boston.
83.....O. S. Kendall & Son, 564 Main St., Worcester, Mass.
84.....Oakley Steel Foundry Co., Millbury, Mass.
85 (a).....West Disinfecting Co., Boston.
85 (b).....Atherton Pin Grid Bar Co., Providence, R. I.
86.....Keystone Lubricating Co., 10 Oliver St., Boston.
87.....Oneida Community, Ltd., Onedia, N. Y.
88.....Special.
89.....Farrington & Co. (Geo. Otis Draper), 15 State St., Boston.
90.....Cling Surface Co., Niagara St., Buffalo, N. Y.
91.....Hector Chiariglione, Victoria Ave., Pueblo, Col. (T. Oliver Dowd, Medway, Mass.)
92.....H. W. Butterworth & Sons Co., York and Cedar Sts., Philadelphia, Pa.
93.....Bell Pure Air & Cooling Co., 90 West St., New York City, N. Y.
94.....Holtzer-Cabot Co., Brookline, Mass.
95.....C. J. Root Co., Bristol, Conn.
.....D. P. Nichols & Co., Boston, Mass.
.....Hohmann & Maurer Mfg. Co., Rochester, N. Y.
.....Atherton Pin Grid Bar Co., Providence, R. I.
.....Standard Fibre Co., Somerville, Mass.
.....J. H. MacAlman, Boston, Mass.

Brown & Wales Co., Boston, Mass., in connection with a full line of power transmission machinery, showed a standard roller bearing for line shafting which is meeting with very generous success.

The exhibit of the Keystone Lubricating Co., Philadelphia, was in charge of H. L. Carpenter, manager of the New England office, 10 Oliver St., Boston, and George H. Mahan, New England salesman for the company. Different densities of Keystone grease used in the various parts of a mill were shown. This company's grease is of particular interest to textile mill men as it is adapted to lubricating textile machinery. It is used in cylinder boxes on cards and on steel roll necks on speeders, etc.

The Edge Moor Iron Co., with works at Edge Moor, Del., and Boston office at 79 Milk St., was represented by George B. Clark, N. E. manager. It had a complete line of safety water tube boilers.

The Spaulding-Perkins Co., North Rochester, N. H., manufacturers of fiber goods, fiber receptacles for textile mills showed its specialties: Roving and cordage cans, mill boxes and baskets, trucks and factory cars. This firm was represented by Harry A. Perkins. Mr. Perkins is also representative of J. Spaulding & Sons Co., N. Rochester, N. H., manufacturers of shoe trees.

American Steam Gauge & Valve Mfg. Co., represented by Urban H. Nickerson, 219 Congress St., Boston, Mass., in addition to their regular line of steam gauges and safety valves showed the American-Thompson improved indicator. Also the American nozzle piezometer which indicates pressure and flow of water instantly. This latter is especially designed for insurance inspection bureaus, fire departments, and water departments.

Wm. Sellers & Co., Philadelphia, operated a series of rope and belt drives to show the application of standard appliances which they manufacture for the transmission of power. The majority of the bearings are cast iron ring self oiling, which they have advocated as the most efficient bearing for line shaft work. This exhibit was in charge of Frederick W. Ancona.

The American Warp-Drawing Machine Co., Boston, Mass., exhibited machines that do away with the last hand operation in the cotton mill, and successfully perform the accurate work of drawing in the warp through the harness, reed, and warp stop motion, in a manner that displays almost human intelligence. The company also exhibited three of its standard types of machines, and a new machine for drawing the tuft yarn into the tube frames used in the manufacture of axminster carpet.

The Sub-Target Gun Co., Boston Mass., was in charge of E. P. Holly. The apparatus shown was a simple self-contained device that eliminates all hot water and steam heating difficulties and circulates any fluid.

Crane Co., Chicago, with Boston office at 399 Atlantic Ave., showed specialties of tilt non-return and direct return steam traps, represented by J. O. Woodsome. These traps are used for steam working pressures up to 200 pounds.

The exhibit of the Carbolineum Wood Preserving Co., 349 W. Broadway, New York, was in charge of Ernest F. Hartmann, president of the company, and F. C. Bartels, manager sales agent. A feature of the display of this concern was an exhibit of hundreds of original orders from textile mills throughout New England and the South. Textile mills have found avenarius carbolineum an excellent solution to use on their wood floors, especially in dye houses. It preserves them against dampness, water and acids.

Alexander S. West, salesman for Rice's mill white, Providence, R. I., was a visitor to the textile exhibit.

Herbert Rice, secretary and treasurer of the U. S. Guttapercha Paint Co., Providence, R. I., attended the textile exhibit.

The Grant Nail & Supply Co., Boston, Mass., exhibited steel pulleys of the American Pulley Co., in charge of W. B. Weston; the "Turney" adjustable machine reamers in charge of William Turney, the inventor; "fleet" high speed, flat twisted drills; Gilbert wood split pulleys; Hercules, Universal and American Pioneer pressed steel hangers; and New York leather belting, in charge of O. G. Bills.

Brown Bros. Co., Providence, R. I., represented by George Lovell exhibited the universal let-off friction which reduces the weight in some cases as much as 95 per cent. For automatic or shuttle changing looms an equal percentage of thin places is saved. On silk looms up to 200 pounds of weight may be saved. It is easily regulated and adapted to all warps up to 424 picks to the inch.

The United Cotton Gin Co., of Boston, had on exhibition a small hand model showing the difference between their "disc" and the saw tooth gin. It was a very generally expressed opinion that the development of the "disc" gin would mean a great saving to the textile industry.

The Heine Safety Boiler Co., St. Louis, Mo., exhibited a boiler and super heater under the direction of N. H. Emmons, 176 Federal St., Boston, Mass.

Howard Bros. Mfg. Co., Worcester, Mass., in addition to their complete line of cards, were pushing a patent end clip by means of samples showing the method of riveting to foundation.

The exhibit of the Carrier Air Conditioning Company, 39 Cortlandt St., New York City, was in charge of J. Irvine Lyle, New England manager. Mr. Lyle was assisted by E. T. Murphy of the Philadelphia office, and Herman Helmes of the New York office. The concern displayed one of its humidifiers in operation and also its automatic humidity controlling devices.

The exhibit of the Roto Company, Hartford, Conn., comprised a number of types and sizes of air driven and steam driven tube cleaners. The machines exhibited included complete equipments as standard for fire tube and water tube boilers, and illustrated the line of Roto devices for cleaning tubes of steam boilers, condensers, heaters, economizers and other steam apparatus. Mr. Darlington, the manager of the company was in attendance.

Among the many interesting features was a new belt covering being introduced by the American No-Slip Pulley Cement Co., 40 State St., Boston. This is something entirely new in this field, and is attracting a very great deal of attention. A very ingenious model was used in illustrating the effect of this covering, and a number of practical demonstrations as to its actual value were to be seen at the exhibition. This covering is a cement which may be applied with equal success to any pulley whether wood, paper, iron or steel. One of its great advantages is the elimination of all belt dressing.

The Scandinavia Belting Co., Boston, Mass., gave a practical demonstration of their belting in operation.

The Crocker-Wheeler Co., Ampere, N. J., showed its new designed squirrel cage motor for cotton mill work. This motor will give over 50 per cent. starting torque with one and one-half times line current. It will, in most cases, take the place of the resistance type motor. By the use of magnetic bridges of steel, open slots are used enabling factory wound coils to be readily inserted in case of repairs. The bearings and shaft are unusually large.

D. B. Nichols & Co., Boston, showed the Frayer-Miller trucks.

Chas. J. Jager Co., 283 Franklin St., Boston, showed power pumps, gas engines and spraying engines.

Copper ore paint was exhibited by T. C. Leavens, 131 State St., Boston,—of one color, one quality and invaluable for buildings, bridges, fences, floors, fire escapes, smoke stacks structural steel, water wheels, flumes, boilers, piping, tanks, roofs, etc.

The Cling Surface Co., Buffalo, N. Y., was represented by Charles F. Chase, manager Eastern United States and Canada division. This company's belt filler and preservative makes and keeps a belt or rope pliable, clean and preserved, doubling its life or more. It is not sticky. It penetrates the belt or rope where needed most.

The trustee of the Lowell Institute has established, under the auspices of the Massachusetts Institute of Technology, a free evening school for industrial foremen. The exhibition of the work of graduates of the institute was particularly instructive and indicated a high degree of accomplishment.

The Whitin Machine Works, Whitinsville, Mass., represented by E. H. Rooney, showed a ribbon lap machine and a sliver lap machine, also a high-speed combing machine in operation on various fibers.

Jenkins Bros., 35 High St., Boston, were represented by J. D. Stiles, and showed the Jenkins valves and packing.

The Standard Fiber Co., Somerville, Mass., was represented by J. W. Brock. This company showed a complete line of seamless roving cans also hard and flexible fiber for various purposes.

The Pyrene Co., 34 West 33d St., New York, was represented by T. H. Agar and exhibited "pyrene" a new chemical fire extinguisher which will not injure any material it is thrown on, will never freeze, will never loose its strength, and needs no recharging. This compound also instantly smothers burning gasoline, kerosene, turpentine, etc.

The White Company, Cleveland, Ohio, was represented at their booth by C. A. Gilmore, Boston salesman. This concern showed a very handsome model of White's steam car, also illustrated White's ambulances, patrol wagons and busses.

The Hohmann & Maurer Mfg. Co., Rochester, N. Y., represented by O. C. Dusossoit, showed a complete line of thermometers as well as other instruments of like character.

The Atherton Pin Grid Bar Co., Providence, R. I., exhibited a positive split lap preventer, and dirt eradicator, which has been tried out in several large mills and run as high as 30 percent. waste and not a split lap to be found.

The Stafford Co., Readville, Mass. exhibited four "Ideal" automatic shuttle changing looms. One 40-inch 18-harness dobby loom equipped with a feeler motion making perfect cloth with practically no waste. The novel feature in this feeler motion is that a cop or bobbin wound in the ordinary way is used, and the yarn runs off to the last yard or two, avoiding the necessity of stripping and the consequent waste. A 32-inch 3-harness drill loom was shown equipped with a double work pick finder. On this loom can be woven without adding any extra mechanism whatever, plain two-harness weave, three-harness drill, four-harness denims and five-harness sateens. The largest loom (running) shown by this company was a 90-inch sheeting loom. There were no thin places or mispicks of any kind, and the cover of the cloth was very superior. Another novel feature of the exhibit was a 40-inch two-harness sheeting loom which was being operated with cop and bobbin filling at the same time, the magazine being loaded with cops and bobbins alternately. All these looms were equipped with the "Ideal" automatic filling changer which replaces the exhausted shuttle with a fresh one, following motion for motion the operation of a weaver on the plain cotton loom.

(Continued on page 283.)

SOUTHERN TEXTILE ASSOCIATION.

The Southern Textile Association met at Greenville, S. C., on the 10th of last month. The meeting was called to order by Vice-president C. F. McCall Greenville S. C. N. T. Brown, superintendent of the Pilot Mills, Raleigh, N. C., was elected to fill the position of president. W. P. Harmick, Columbia, S. C., was elected second vice-president. Mr. Harmick is connected with the Olympia Cotton Mills, Columbia, S. C.

The association voted that Spartanburg, S. C., be the place for the next meeting.

During the meeting a banquet was held at the Blue Ridge Hotel, after which the following responded to calls for speeches or remarks: C. F. McCall; J. H. Bagwell, of the Chadwick-Hoskins Mills, Charlotte; E. L. Merrow, of the National Ring Traveler Co., Providence, R. I.; A. M. Hamilton, of the Drayton Mills, Spartanburg; J. M. Davis, of the Newberry Cotton Mills, Newberry; and E. Howard Bennett, Boston.

The meeting was welcomed to Greenville by the mayor, the Hon. G. H. Mahon.

Lewis W. Parker of the Monaghan Mills, Greenville, S. C., addressed the meeting on the relation of the overseers and superintendents to the management of the mill and the help working in the mill.

He said: "The position of overseer or superintendent was a medium between the management and the people who labored in the mill, and that the quality of the work depended on the overseer and superintendent, and that if they did not see to the minor details it was impossible for the management to turn out good material, and, furthermore, the overseer and the superintendent should train the hands in the mill to turn out the best possible work, and to make the hands use their common sense and not be mere machines.

"I believe in compulsory education, but that every class of children should be compelled to go to school as well as the mill class, and, furthermore, if the law is enforced, it should be enforced for every class.

"I do not believe in child labor, but the existing conditions are not so bad as it is painted, and it is the business of the overseer and superintendent to see that no child shall work who is not old enough.

Prof. C. S. Doggett of Clemson College, S. C., spoke on the subject of dyeing. He said that all colors, regardless of black and white, depended on the colors of yellow and blue, and that formerly a man had to go to a chemist to have his colors mixed, but now he could, by the use of the two colors, yellow and blue, get any desired color. He looked forward to the time when the South would be making as good prints as any part of the country, and that he believed that it was near at hand.

V. B. Bogan, of the Beaumont Manufacturing Co., Spartanburg, S. C., read a paper on how to reduce seconds and keep waste below par. He said in part: "The first place to start is in the card room. Black oil is the worst thing to contend with from the card room, and it starts at the picker room by having careless oiling. One must watch the hands about using dirty oily hands. By piecing ends with black hands much damage is done and many seconds caused. The next thing to watch is the slubber and speeder hands. They, too, can do a great deal of damage by piecing ends with dirty hands and by causing hard ends. The man in charge of the slasher should understand his business thoroughly. I have been in mills where great balls of waste are wound off and sent to the waste house. This means great loss to the mill. A man should be very careful in making up size. It will not do to estimate weights. Everything should be weighed accurately, if you wish to get good running work in the weave room. The next place is the weave room. This room is like all the rest in that overseers lay all the bad work to work done in another room. However, there is a great deal the weaver can do to make his work run well. The first thing to reduce seconds here is to see that the looms are in first-class fix, and then see that the section man looks after his work. Here, too, there is a need for careful work, for I have seen a section man go to fix a loom, and when he got through it was not possible to tell whether the cloth was black or white. Such things as this cause seconds and waste. The amount of waste for a mill running on thirties to forties should not be over 15 per cent., and the amount of seconds should not be over 5 per cent. Where a mill makes 20 per cent. to 30 per cent., and the same amount of waste, the loss on seconds and waste will pay the superintendent's and overseers' wages and sometimes do more than that. A great many mills think if they can get from 90 per cent. to 95 per cent. that they may let the seconds and waste go. I know of one mill where the seconds do not amount to more than 2½ per cent. the year round. Where a mill makes a small amount of seconds, the waste is small."

Hugo Koblenger, of the Brunswick Chemical Co., Brunswick, N. J., read a well prepared paper on "Sizing and Finishing."

SILK ASSOCIATION OF AMERICA.

Jacques Huber has been elected secretary of the Silk Association of America for the ensuing year, and Ramsay Peugnet elected assistant secretary.

It is most important that the manufacturer should know what goods can be dyed after weaving, and what ought, for the sake of fastness, to be dyed in the yarn, and last, but not least, he must not expect too much for his money.

Fast dyeing is dearer than loose dyeing, and it is folly to expect a dyer to turn out satisfactory work for insufficient remuneration. Goodness and cheapness are two characters rarely found in combination.

The dyer should know exactly what treatment in the way of finishing, for example, the goods must pass, after leaving his hands, so as to be able to select suitable dyes and processes.

In ordinary men's garments we seldom hear complaints of want of fastness, and these are just those classes of goods where bright colors are the least demanded.

Ladies' garments have to exhibit bright hues, and here we find a degree of all-round fastness very inferior to that exhibited by men's garments.

It is a common feature in designs that what forms the ground weave of one design is frequently adopted as a stripe weave to ornament another design in which the ground differs from the first one.

COTTON MANUFACTURING

PROCESSES IN COTTON MANUFACTURING.

THE PROVINCE OF TWIST. THE MULE AND RING FRAME COMPARED. THE SPINDLE. THE TRAVELER. SEPARATORS.

BY CHARLES E. BARNHARDT.

PART VI.

The object of the processes which have been thus far treated in this series of articles has been that of cleaning, arranging the fibers in a parallel position to each other, making uniform, and drawing out the stock. In every instance the stock delivered from a machine is lighter than when fed into it, and contains just enough twist to hold it together and prevent its being stretched or strained when unwound from the bobbin which is fed into the next machine. The minimum amount of twist in roving is desirable for the fact that it permits the stock to be more easily and uniformly drawn out, the little twist that is put in the roving being practically eliminated when passed through the rolls of the next process or roving frame or spinning, as the case may be.

RING SPINNING FRAME.

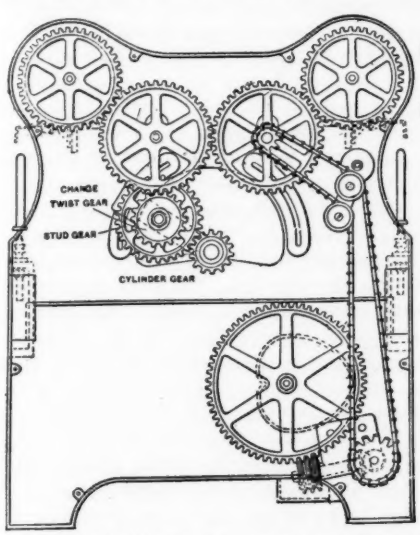
In the manufacture of single ply yarn the final process is that of spinning, which consists in drawing out the stock to the required size, and in giving it the amount of twist necessary to make the yarn of the required strength. While the spinning frame is built on entirely different principles from the roving frame, yet the object of the two is practically the same, the principal point of difference being in the amount of twist imparted to the stock. The objects accomplished in spinning may be briefly stated as follows: The completion of drawing out the stock to the required size, the insertion of the necessary amount of twist to give the thread produced enough strength, and winding the thread or strand of yarn on a bobbin. The mule frame is the oldest system of spinning, and is still used to a large extent in the manufacture of fine yarns. However the ring frame is almost entirely used in the Southern States, as coarse numbers are usually spun, and on account of the greater production and less labor cost than is required in connection with the mule frame. A feature in favor of the mule frame is the fact that it produces a better and more even grade of yarn than the ring frame, and mule spun yarn always commands a higher market price than ring spun yarn.

As there are comparatively few mule frames in operation in this section of the country, only a brief description of this process will be given. The bobbins of roving are placed in a creel at the back of the machine, the strands of roving being passed through the rolls and drawn out in the same manner as at the roving frame. The spindles are mounted on a carriage which moves backward and forward in its relation to the rolls, the distance of its traverse being about five feet. When the spindles are moving away from the frame the stock is being delivered by the rolls, the speed at which the spindles move away from the rolls being just enough to keep the ends at a slight tension, the twist being put into the yarn at the same time. When the spindles reach their greatest distance from the rolls, the latter are automatically stopped and the direction of the motion of the spindle carriage reversed. The yarn is wound on the cop or spindle while the carriage is being moved back towards the rolls, the motion of the latter being stopped in the meanwhile, the spindles revolving only fast enough to wind up the thread that has been spun during the outward move of the carriage.

The mule usually winds the yarn produced on a paper tube which is placed on the spindle, but in some cases it is wound on the bare spindle. The mule is a much more complicated machine than the ring frame, the floor space required for it is very much greater, and more skilled labor is required for its operation. Under ordinary conditions it is not practical to spin finer yarn than No. 60s on ring frames, while as high counts as No. 500s is said to have been spun on mules. The same numbers can be spun on a mule with a good deal less twist than on the ring frame. This is quite an object when considering the fact that it is highly important that some hosiery yarn, and that for other purposes, must be very soft twisted, and can only be produced on a mule frame. The yarn produced on the mule is more even than that from a ring frame from the fact that a thin place in the stock between the front roll and the spindle of a ring frame will receive more twist than a thick one, and thus be made finer, while, with a mule, a thin place would naturally receive more twist than a thick one, but on account of this it will be a little stronger and assist in drawing out the thick places with less twist, causing the thread to be more uniform.

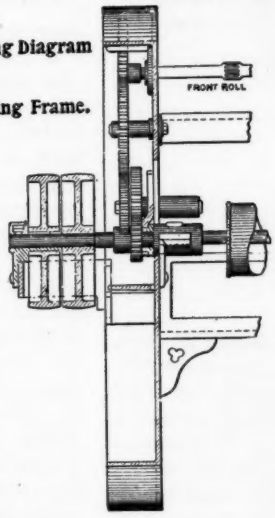
The ring spinning frame is a very simple machine in appearance and construction. However, there are many things in connection with the operation of it which require close and careful attention in order that the best results may be obtained. In most cases, the roving is fed to the rolls double, or two ends together, but in some instances each end is fed singly. The construction and op-

eration of the rolls are similar to those of the roving frame, the three top rolls being weighted by one weight, this weight being hung from a lever and connected with the saddles resting on the rolls, by means of a stirrup. The yarn delivered from the front roll is passed through the guide of the thread board, thence to the traveler on the ring and wound on the bobbin which is placed on the spindle. The spindle is driven by means of a cotton cord or band which is passed around the whorl of the spindle and the tin cylinder, the latter extending the length of the frame and directly underneath its center, the driving pulley of the frame being on the end of this cylinder. The gearing may be at the pulley end or the tail end of the frame. It is more convenient to get at to make adjustments if at the tail end, though if at the head or pulley end the strain of driving the gearing is taken off the cylinder, and for this reason it is more desirable that the gearing be driven from the pulley end. The spindles are always driven towards the right hand, or in the same direction as the hands of a



Gearing Diagram

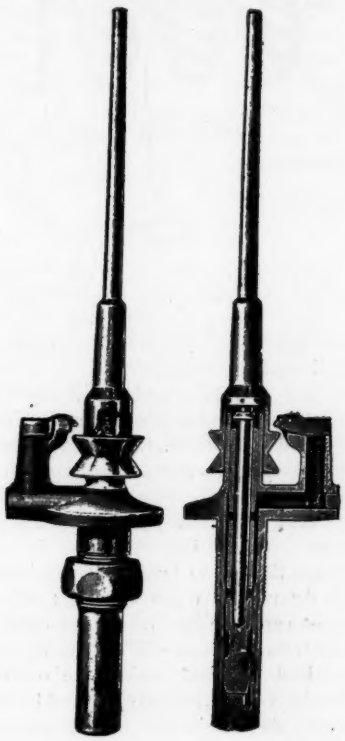
Spinning Frame.



clock. The bobbin is tight on the spindle and thus revolves with it. The twist is put into the yarn by means of the revolution of the spindles. The traveler is loose on the flange of the ring so as to permits its being easily carried around the ring by the thread which is being wound on the bobbin. The traveler answers the same purpose to the spinning frame that the flyer does to the roving frame, i. e., guiding the thread on to the bobbin. The ring rail which holds the rings, is moved up and down by means of a traverse motion which is arranged for either a warp or filling wind, as the case may be. In the warp wind, a layer of yarn is wound the whole length of the bobbin at each traverse of the rail, in the same manner as with the roving frame, each traverse being a little shorter than the preceding one, in order to taper the ends of the bobbin so that it will not tangle. In the filling wind, the cam of the builder is made in such a shape that the length of traverse is only about two inches, and starting from the bottom of the bobbin, each successive layer of yarn is made to start a little higher on the bobbin than the preceding one, the length of the traverse being the same at all times. Thus it will be seen that the filling wind will permit the yarn to be readily unwound by pulling the end of the thread from the end of the bobbin, as is required when the bobbin is placed in a shuttle from the loom, while with the warp wind this could not be accomplished. Most modern spinning frames are equipped with combination builders which are provided with cams for either warp or filling wind, and by means of slipping the required cam into position the frame can be made to produce either a warp or filling wind.

One of the most important parts of a spinning frame is the spindle. The gravity spindle has proven itself to give good results, the principal features of importance in connection with it being its large oil reservoir, it being made large enough to hold sufficient oil to lubricate the spindle for four to five weeks. Another point in favor of it is the arrangement by means of which the spindle is allowed, to a certain extent, to find its best center of revolution, and thus prevent wear and vibration and requiring less power to drive it.

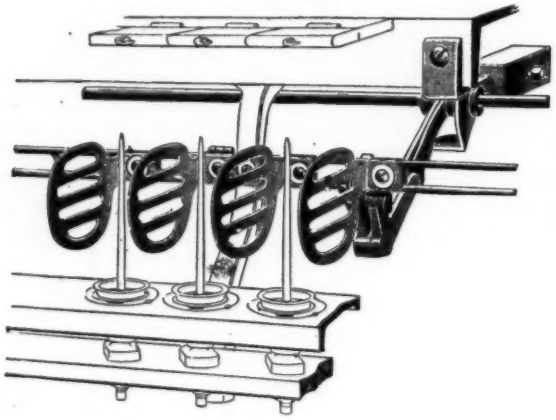
Since the traveler is carried around the ring at a very high rate of speed by means of the thread being spun,



GRAVITY SPINDLE.

it will be readily understood that on account of the centrifugal force, the portion of the thread between the guide wire of the thread board and the traveler will have a tendency to bulge out or "balloon," as it is technically known. On account of the spindles being set so close to each other, if provisions are not made for preventing this ballooning, the ends would be continually whipping against each other and breaking down. To overcome this difficulty separators are used on all frames with a warp builder. With a filling builder the traverse is so much shorter than with a warp builder, the ends do not balloon near so much, and in most cases the separators are not required for filling frames. The separators are usually made of perforated sheet metal and are attached to a rod running lengthways

of the frame just back of the spindles, and are made to traverse up and down with the ring rail. Each separator blade should be set so that it will be exactly in the center of the space between the spindles, and its surface should be kept perfectly smooth so there will be no danger of the yarn catching onto any projection which would cause it to break down. The amount of ballooning is governed to a great extent by the weight of the traveler used. The spun thread is passed through the traveler, which is carried around the ring by the yarn at almost the same speed that the bobbin revolves, the only difference being the length of the thread delivered from the front roll. The traveler will



Separators.

naturally sag back enough to allow the amount of thread delivered by the front roll to be wound on the bobbin. It will be readily understood that this winding effect will always be produced regardless of what weight of traveler is used. However, if a light traveler is used it is more easily carried around the ring and consequently there is more ballooning, while on the other hand if a heavy traveler is used, a heavier pull is required to carry it around the ring with less ballooning, but if much too heavy it will cause the end to break. It requires a little experimenting to determine the proper weight of traveler to be used. In most cases the best results are obtained by using the lightest traveler which will not damage the yarn by allowing it to beat too hard against the separators. When running double roving the traveler should be heavy enough to break down the end in case one of its strands of roving should break or runs out, thus preventing any singlings from being wound on the bobbin.

THE BEST WAY TO GET THE BEST RESULTS.

The Carding Department. Cleanliness and System Are of Great Importance.

BY J. EDWIN YON.

The writer has had a great many years of cotton mill experience from the broom to overseer in the carding and spinning departments. The best way to get the best results is a great question that confronts us to-day. To arrive at the best way for getting the best results that will enable us to improve ourselves to a higher standard of efficiency, in our particular vocation, is to teach ourselves and the general help throughout the mill the great importance of *being careful,* and the latter how they should manage and keep their respective places neat, so they may realize that it is to their interest to do so. If the help will be made to realize the importance of this they will get more contented and satisfied and there will be less moving from mill to mill. I have known help that would hardly get use to their overseer and his rules and the class of goods they were on, before they would move to another place and the same thing would occur elsewhere. Now, my brother overseer, what is wrong? Can you say it is the help's fault, or is it because we are not good managers? This is a great problem that is left for us to solve.

I have been a close observer all along down the line these many years of experience in the cotton mill business, watching the management and swapping ideas with good mill men of various abilities until I have consolidated all these ideas into one which I call my own, and trust that this one idea of mine will serve to be of some good to some one.

MIXING.

Let us start in the opening room. This is where the bales of cotton are opened to be mixed ready for the hopper or opening machine. Before mixing the bales of cotton should be graded, and each grade set aside by itself, and mixed with its respective average grade. Generally there is not more than three grades of staple in a goodly lot of bales of cotton, say, 1⅛, 1, ⅞ inch, unless there is being run a very long staple, such as Egyptian, Sea Island, or Mississippi peeler staple, ranging from 1¼ to 1⅜ inches, But with the ordinary length of staple it would be a very good idea when mills use as many as two or three grades of cotton, to make two or three corresponding classes of goods. Then it is a very easy matter to make the proper adjustments for each class of goods. Better results would be realized, work would run better, the help could turn off more work, and a better quality of product would be the result.

PICKING MACHINERY.

The opener should not be speeded too high, and the apron should be set so as to deliver only the proper amount of cotton to the feed rolls on the breaker for the desired weight of lap. The breaker should have double beaters —one beater with three blades, the second, next to the calender roll, with two blades. The feed rolls should be set properly to the beater blades according to the average staple of the cotton. The grid bars should be set so there shall be no waste or good cotton mixed in with motes. The machines should have the correct amount of draft, which can be regulated by adjusting the doors in the flues of the fan. The fan should have the proper speed which can be regulated by changing the fan pullies to the speed desired.

The intermediate picker is just about the same as the finisher picker, or lapper, only with the difference that in place of beater blades on the beater the beater is a combing beater partly made of wood with small steel spikes set in which serves as a comber to the cotton. This machine should have good attention as well as the other pickers, as this is the finishing process in the picker room. The screens should be cleaned daily so that all the lumps of cotton that accumulate on their sides shall be kept out, for

if they are allowed to remain they will choke the screen and cause it to slip on the shaft to its possible damage. The evener should be taken down and cleaned once a week, so that each part in the scale of the evener shall have its proper motion. If the evener is kept in good shape as well as the screen and calender rolls, and there is the proper draft, there will be produced a good, even lap, otherwise there will be uneven laps, with thick and thin places, which will cause bad work throughout the entire mill. Calender rolls should be cleaned once a month at any rate. Oil holes should be kept cleaned out, and places that should be oiled should be attended to at the proper time. It should be so arranged that the pickers can gain enough laps during the run of the week so as to stop off on Saturdays or a part of Saturdays and this time given entirely to cleaning up; and there should be enough help allowed in the picker room to keep everything in first-class shape. Once a picker room is run down it is hard to bring it up again.

THE WASTE MACHINE.

Before leaving the picker room let us not forget to notice the little waste machine, in the corner, lonesome as it looks to be, housed in with a tin lining. But do you realize what an important part it plays in making the work run good. This little waste machine, in the corner, every cotton mill ought to have one. Its duty is to tear up the roving waste back into lint again and extract the hard yarn strings that accumulate in the spinning rooms. If these little hard strings are let to go back into the work again they will make it run bad, as every time one of these strings passes through the rolls an end will come down and the machine stopped with a loss of production, a hard end made, and a bad place made at the splice, which, when it strikes the spinning, results the same there with an end down, running around the lick roll, lap waste accumulating an end to be put up, another bad place at the splice; and another little hard string gets in the waste, and all goes back to this little machine in the picker room. The importance of this waste machine is thus seen. Keep a hand with it all the time necessary to run up the waste as it should be, and when this is done let him clean up the machine in good shape, and if there is no more waste to clean let him do something else, as sweeping the floor, or help cleaning the picker.

CARDING MACHINES. GRINDING.

Now we will go into the card room, and notice the cards first. The card is the most important machine in the mill. The writer has had good experience on it, and has attended to its grinding for six years straight. Cards should be kept clean and well ground, and set properly, and great care should be taken of them so that no pieces of cotton ties or buckles or anything else shall get into them that will serve to injure the clothing. Comb bands should be kept tight so that the comb shall have the right speed in order that the web it produces shall come nicely from the doffers, for if the web is allowed to lick over the comb, and goes back, it will make flakes in the sliver and cause uneven work. In grinding, the doffer should be set to the cylinder loosely to a No. 7 gauge. The licker-in should be set to the cylinder to a No. 7 gauge, and the feed plate should be set to the licker-in to a No. 12 gauge, and the feed roll should be cleaned and bearings oiled. The next time grinding around, the doffer should be examined and flats set to the cylinder to a No. 10 guage and the screens and front plate set to a No. 22 guage. The doffer should be examined, the licker-in taken out from its place, and bearings and screens cleaned and the mote knifes polished and set. The bottom mote knife set to the licker-in to a No. 10 guage. The top mote knife set to the licker-in to a No. 12 guage. The edge of the shell roll feed plate should be polished so that it shall have a clear setting to the licker-in. The mote knife should be set so that there shall be no good cotton accumulate in with the motes and trash in the mote box. The drum or flat grinder should be changed from card to card every day, grinding all the time. The burnishing brush treated in like manner. Card and coiler heads should be oiled properly and at the right time.

DRAW FRAMES.

The draw frames. These are also very important and great care should be taken of them. They should be well oiled and well cleaned. The metallic rolls should be taken out, and they and their bearings cleaned. Their flutes should be cleaned out with a piece of card clothing, wiped up good with clean waste, and then placed back in the stands or bearings, oiled and a small amount of good grease placed in the bearings. The knock-off motions should work freely, all the weights should be adjusted alike, otherwise there will be bad work going through, which will serve to make thick and thin places in the yarn. If leather rolls are being used they should be re-varnished once a week. I can recommend the following as a good recipe for roll varnish:

One pound glue.
One-half gallon good vinegar or acetic acid.
One-half pound chrome green.
One ounce oil of origanum.

ROVING MACHINES.

Now the slubbers, intermediates, and jack frames are all treated the same so far as the management is concerned. They should all be kept cleaned and oiled properly. Their steel rolls should be taken out from their stands or bearings once or twice a year and cleaned well, and the spindles should be set or adjusted at the same time. All the rolls should be set to suit the length of staple.

Each and every process should be kept in good shape and then the work will run well, and the help will be contented and good results assured.

DIFFERENCE IN VIEWPOINT OF MANAGER AND OPERATIVE.

BY B. D. RALEIGH.

Having worked as an employee in cotton mills, and having been connected with the office work, the difference in viewpoints taken by the operatives and managers has often struck me very forcibly.

The manager in looking for production and low cost, which to a great extent depends upon the former, does not seem to realize that frequently an operative stays out for an indisposition that is not confining, yet so depressing that were he at work, there would be a loss on account of the small amount of labor rendered.

This manner of looking at such, while wrong in a sense, is very excusable when we take into consideration the fact, that there are so many operatives who look upon their job in the mill as a last resort; something to do when nothing else can be had; or when by working four days in the week and loafing two, they can still pay their board bill and supply the necessaries of life.

The manager and operatives both have their viewpoints which are at variance. However, while the manager is

wrong in some points, the lack of appreciation on the part of the operative of the necessity of regular attendance to his duties, and an honest day's labor while he is in the mill, is largely responsible for the manager's error.

By far the greater per cent. of the operatives do not realize that, if they are out for even one day in the month, when this privilege is extended to each one it amounts to a considerable item and that extra hands must be carried on the pay roll to meet such an emergency, or else the machinery will be idle. The first meaning an extra expense on acount of the extra hand, the last meaning expense by the loss of production.

Take the case of a weaver and we see that his looms being idle means not only a loss of production to the company, but a loss to himself. And yet you will find any number that think theirs is the only loss, and that the overseer should not make any kick because he staid out to show his friends a good time, or went hunting. Even if a spare hand ran his loom it is probable that for two days the spare hand had only general work to do, and, therefore, not only himself but the company was a loser.

Not only is this the case in the weave room, but throughout the entire mill. And as one department is dependent on another, the inability for one room to turn out production affects the one ahead, and sometimes the one behind it.

I do not believe there is a cotton mill in the South in which operatives are limiting their production for fear of a cut in wages, as do many machinists and other skilled laborers. Then why do they not turn out the production they are capable of doing? This is a question which every mill man has asked himself and has answered in many different ways. Long hours, lack of ambition, scarcity of labor, easiness of getting another job, necessitating the payment of such wages as to produce the second condition.

The South has produced mills faster than it has trained the labor. This has been a great drawback to the mills, but so far, more so to the operatives. The average operative in a cotton mill is in much better condition than he was before coming to the mill, both in regard to finances and opportunities. However, the large demand for mill help has to a great extent deprived them of the necessity of sticking to a job and giving value received, thus robbing them of that stamina of character which makes success.

Welfare work has been attempted at almost every mill of any size in the South, and many have been failures and few successes. It is a splendid thing for a mill to do; and could they get any encouragement they would gladly enter into it. But one who has never attempted it can not realize the task that underlies such a movement. Until the supply of help is nearer to the demand, and the operatives realize that when they secure a job they had best hold to it and give value received of their labor, welfare work will never be much of a success. But when that time does arrive it will be of the greatest benefit to both parties concerned.

The best welfare work that can be accomplished at the present time is to get your operatives to understand that by being at their duties regularly, and performing them as they should, they are benefiting not only themselves, but the mills. The best way to instill such a spirit must be worked out by each for himself. Suggestions would be helpful, but they must be altered to suit the case.

YARNS FROM WASTE AND LOW GRADE COTTON.

F. H. RICHARDSON.

Many like to read what others have to say but feel a delicacy in relating their own experiences. Much good is derived from an exchange of ideas and experiences, and while I do not expect to enlighten any fellow mill man to a very great extent, still what I write may be beneficial to some one.

Let me relate briefly my experience with coarse cotton yarns from 2-1/2 to 8s made from waste and low grade cotton. Our raw stock consists principally of picker motes, card-room waste and low grade cotton.

In preparing the material we put the motes through a waste cleaning machine, realizing about one-half or two-thirds working stock, which is re-run with whatever per cent. of waste and low grade cotton desired. We used 33 to 50 per cent.

The mix is now ready for the opener. The process through the mill is practically the same as any other coarse yarn, though more tedious.

The picker tender has to be careful lest cotton collect on the beater causing a thin place in the lap, variable weights and irregular carding following.

What causes the cotton to wrap around the feed roll? Does the position of the beater cause the trouble? What kind of beater is best adapted to this kind of work and how should it be set?

In order to relieve the cards of their accumulation of foreign matter we have found it necessary to strip them four times a day, the strippings being returned to the cleaning machine to be re-mixed. A good deal of care has to be exercised in mixing the material as it is necessary to have the yarn as even and strong as possible.

Roving for four spinning frames is delivered by a ten by five slubber, while a twenty by six slubber takes care of four feeders.

From the speeders we ship quite a lot of yarn on paper tubes. Here we find the Dunn flyer superior to the ordinary flyer owing to the fact that it makes a smoother bobbin. Would like to hear from some one else on the subject of flyers.

In spinning we have had some trouble with shell rolls. Hard ends or a lump will frequently make a dent around the roll rendering it useless so far as further service is concerned. Lint and mote will accumulate about the bearings, absorb the oil, and cause the roll to stick.

Let us have criticism, both favorable and unfavorable, on the shell and solid roll.

What advantage is the "fancy" to the card—what duty does it perform?

GEORGIA INDUSTRIAL ASSOCIATION.

The annual convention of this association, of which every cotton mill in the State of Georgia is a member, will be held this year at the Oglethorpe Hotel, Brunswick, beginning June 4.

The advisory committee of the Cotton Manufacturers Association of North Carolina has decided to hold the next annual convention of the association in Charlotte, Thursday, June 17.

WOOL MANUFACTURING.

BLENDING OF COTTON AND WOOL.

AT FIRST THE TREATMENT OF THE TWO FIBERS IS DIFFERENT. EXCELLENCE OF WORKMANSHIP IS NECESSARY FOR EVERY GRADE OF GOODS. CHARACTERISTICS OF A WOOL AND A COTTON THREAD, AND THOSE OF A WOOL AND COTTON BLEND.

BY JOSEPH H. BARKER.

PART IV.

The preceding remarks may now be briefly summarized as follows:

Cards set to the best advantage and with the point most suitable for scribbling and carding wool, are not suitable for carding raw cotton. Cards with a sharp needle point, and set to the best advantage for carding raw cotton, are not suitable for scribbling and carding wool; but would break and injure the fiber.

If it be proposed to blend raw cotton with wool, the cotton should first be scutched and carded alone, on a cotton carding engine, in a room of the proper temperature and humidity before being blended with the wool, etc.

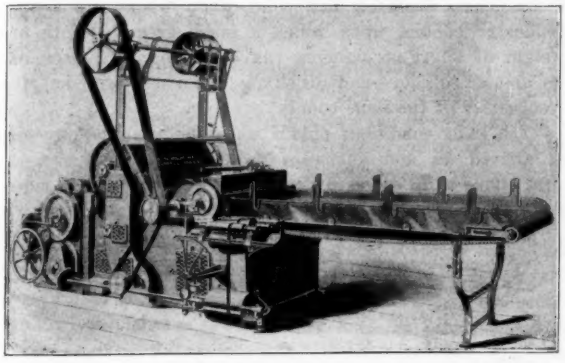


FIG. 3. SCUTCHER.

If it be proposed to blend new wool, which has never been oiled before, with cotton, it is desirable to first prepare and oil the wool and give it time to thoroughly absorb all the oil, so that no oil remains free; and then to blend the two together, and proceed with the scribbling and spinning operations.

If these conditions be carefully carried out, the two fibers—the wool and the cotton—will mix so perfectly together that only the most practiced eye, will be able to detect the presence of the cotton; particularly if rough Peruvian cotton be used.

The scutch Fig. 3, beats out and carries away the seeds and dust, and prepares the lap for feeding the carding engine. The carding engine Fig. 4, it will be observed is not mounted with flats, but is of the roller and clearer type, which is much better adapted for carding cotton which is to be mixed with wool. In the sliver, as it is stripped from the doffer, there is less parallelism of the filaments than is the case when flats are used, and consequently the cotton is in a condition all the more suitable for being blended with wool.

The roping appliance shown in front of the doffer, is not needed when the machine is used for this purpose. It is much better for the light fleecy sliver, as it leaves the fly comb, to be received into a box placed beneath the comb and resting on the floor; and neither to rope it nor compress it in any way, but to blend it with the wool, in as near the same light and fleecy condition in which it leaves the comb, as the subsequent operations of mixing it with the wool will permit.

With cotton so perfectly carded and prepared, it will be appreciated how little need or necessity there is to scribble it (in the strict sense of the word) in the woolen scribbler after the cotton has been blended with the wool. All that remains to be done in the scribbler is to still more perfectly and evenly mix the already carded and opened cotton fibers with the wool, to carry, as it were, the cotton fibers along with the wool; the scribbler in the meantime, being set in the manner most suitable for scribbling the wool, which condition it is needless to say will not injure the cotton.

The foregoing remarks are intended to apply more particularly to the higher class of goods, goods which are made from new wool and new cotton, neither of which have been operated upon before; in which the threads have to be spun small, and be of the most perfect evenness and thickness; and still more for goods where the wool and the cotton are of different colors, or of different shades of color, and where a perfectly even mixture is required. The same care and knowldge of means to the end, are necessary in every succeeding process; and if perfect goods and excellence of workmanship are to be the standard, these conditions can be obtained in the ways indicated, subject to modifications to suit varying circumstances and varying qualities of material. But if something less than perfection, and something less than excellence will serve the purpose, these conditions can be attained in some degree or other, in some other way.

If the cloth to be produced is thin and fine, the threads must be small, and in such a case almost every fiber in the cloth is more or less visible either on the back or the face of the piece, and every imperfection in the mixing and scribbling becomes more or less conspicuous.

In the manufacture of thick, coarse cloths, such as blankets, rugs, and low coarse flannels and dress goods, etc., such extreme care is less necessary, or perhaps it would be more correct to say that the kind of care is different; the points requiring care are different, but not by any means less necessary. It would be just as easy, by improper treatment, to spoil one class of goods as it would be to spoil the other.

Perfection, and excellence of workmanship are just as applicable to and possible in goods of a low character as they are in those of a higher class, and possibly the most conspicuous and noticeable example of this, at the present day, is the excellence and perfection of the goods (low tweeds, suitings, etc.), which are made in the Colne Valley District of the West Riding of Yorkshire, having all the appearance and some of the qualities of high class goods, at prices which are incredibly low.

There are those who are of opinion that the success of the Colne Valley manufacturers is largely due to spe-

cializing—each manufacturer confining his operations to a limited range or class of goods, for which his machinery is specially adapted. There may be some force in that explanation for it is certain that no one class of woolen machinery is equally suitable for all kinds of goods. If the machinery be suitable for coarse wool, it will not be suitable for fine, and vice versa, and if it be more or less suitable for both, it will not be particularly suitable for either.

The effect of mixing cotton with wool upon the character of the yarns produced from such a mixture, and the changes, adaptation and re-adjustments of speeds, drafts and stretches in the machinery, which become necessary, now claims attention.

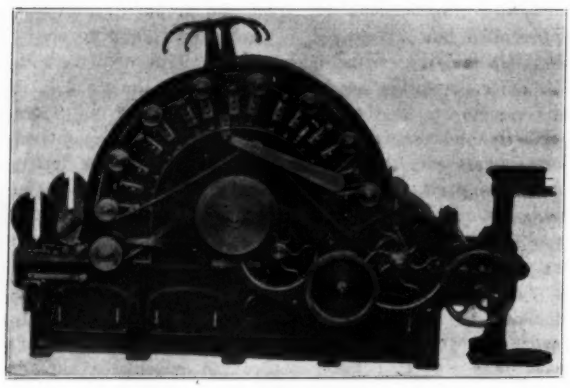


Fig. 4.

A good, pure, all-wool thread of moderate thickness and twist, is very pliable and very elastic, and may be stretched from 15 to 20 per cent. before it breaks. A purely cotton thread, on the other hand, possesses but little elasticity, and is stubborn, solid and hard in comparison, and from a mixture of cotton and wool the thread produced partakes more or less of the character of one or the other, in proportion to the quantity of cotton or wool contained in it.

The loss of elasticity is not confined to the thread alone, but is equally noticeable in the flat sliver or rope formed on the roping part of the Scotch or Apperley feeder, and in the fleecy film of the Blamire and other like feeders, as may be clearly observed when the sliver is folded on the feed cloth of the carding engine or at each return of the blanket on the traveling carriage, as the case may be.

If the blend be all wool of good quality and breed, it is necessary in folding the sliver on the feed-sheet of, say, a 60-in. carder, to give a traverse of some inches more than the width of the machine, sometimes as much as two inches at each end (Fig. 5 C), and as the traveling part of the feeder makes its return from each extremity of the traverse, the sliver will be observed to shrink, or to creep back, and as it were to follow the carriage to the extent of the extra traverse which has been found necessary, be it two inches, more or less; and instead of forming a well defined, sharp fold as shown in Fig. 5 A, the fold would be rounded and "blobby" as shown at B.

The same conditions, but in less degree, by reason of the thinness of the filmy sliver, may be observed in both Blamire's and Ferrabee's feeders, and in them also it is necessary to increase the traverse of the carriage sufficient to allow for the creeping or shrinkiing of the fleecy sliver or film.

If an all-wool blend, such as the one instanced above, were to be followed on the same machine by a blend of wool and cotton, in which there might be from 30 to 40 per cent. of cotton, or more, it would be necessary to shorten the traverse of the feeder at each end, and adjust it in proportion to the decreased elasticity (or creeping or shrinking tendency) of the sliver, the extent of which would depend upon the quantity of cotton in the blend. The extent of the adjustment, or shortening of the traverse, would be regulated and determined by observation of the sliver itself; and when it remained in a settled position at a stretch equal to the width of the machine, that would determine the length of the traverse.

A further indication of the degree of elasticity, or the absence of elasticity, may also be observed if the sliver be squeezed in the hand. The all-wool sliver would be springy like a sponge, and would quickly recover its form and bulk on being released; whereas the mixed sliver would still remain more or less—in proportion to the quantity of cotton which it contained—in the compressed condition, showing distinctly where it had been compressed, and at that point would remain much more dense and compact.

The same reduced elasticity and increased density and compactness of mixed yarns continues throughout every succeeding operation. It is equally observable in the condenser sliver, and for that reason an adjustment of the draft, and the speed of the stripper and the rubbers, becomes necessary as also the draft and speed of the winding drums; the condenser slivers themselves being much more dense, compact, and solid when wound upon the condenser bobbin, upon which a much greater length or weight of sliver or slubbing can be wound, by reason of its greater solidity—and density, as compared with an all-wool sliver of the same counts or weight.

The same conditions obtain when the spinning process is arrived at, and numerous adjustments of speed and draft have to be made, a description of which comes more appropriately in the description of the spinning process.

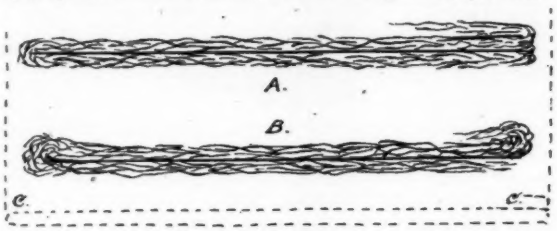


Fig. 5.

In further consideration of the scribbling process, and of the size of the scribblers, and the number and arrangement of their parts, let it be emphasized that the same size and arrangement is not equally suitable for all kinds and qualities of material, and if the best results are to obtained in any given class of material, machines suitable in size and construction, and in the adjustment of the speed of its various cylinders and rollers for that particular class, must be used.

It should not be necessary to point out that machinery which is designed and arranged for scribbling long, coarse wool or shoddy, can not possibly be suitable for scribbling short, fine wool or mungo, whether blended with cotton or not, and vice versa.

To secure success, the machinery must be suitable for the particular kind of material which it has to operate upon, not only in the size, number and arrangement of its parts, but particularly in the card clothing. And it is

obvious, or should be, that the same machinery can not possibly be equally suitable for both coarse and long, and short and fine, material.

Unfortunately many managers are expected to produce on the same machinery, such goods as are in present demand, whether they be coarse and thick, or fine and thin. If there is no demand for the goods which the machinery is designed and suitable for, they are instructed to make such goods as are in demand. It appears to be assumed that a mill is a mill, and ought to be able to make any kind of goods which are required for the time being. But it would be only a little less reasonable to expect a flax or silk mill to turn out cotton or woolen goods.

It is almost a truism to say that, if the machinery be more or less suitable for all kinds of goods, it will not be specially suitable for any.

The most perfect goods are made in those mills which are specially equipped for manufacturing a special kind, quality or weight of goods, and to that specialization is due the high reputation which certain goods from certain districts enjoy.

KNITTING

STITCH REGULATION.

Gauge the Needles Before a Test is Made. How Adjustments Are Made.

BY STEPHEN E. SMITH.

As shown in the preceding paper ("Seamless Footer"—April) the length of stitch depends upon the depth to which the needle hook is forced below the edge of the sinkers. In all stationary needle-cylinder machines the regulation of the loop is accomplished by raising or lowering the needle cylinder and sinker ring. As the cam cylinder which raises and lowers the needles is a device apart from this, it follows that the needle in going downward draws a longer loop if the sinkers are raised, or a shorter one if they are lowered.

In the manufacture of men's half hose three lengths of loops are required. The tightest loops are required in the foot and ankle of the stocking where the garment is desired to fit tightly. At the heel and toe the use of an extra or re-enforcing thread makes it necessary to draw a slightly longer loop in order to prevent making that portion of the fabric hard and inelastic. At the upper part of the leg a slightly longer loop is generally made, so as to make that portion of the stocking fit better, and these loops are gradually shortened as the ankle of the stocking is reached.

In the manufacture of ladies' hose the same variety of stitches is required, the only difference being that the stitches in the upper part of the leg are made considerably longer than those in the foot and ankle.

The adjustment of the stitch and the changes from one stitch to another are brought about in many different ways by different machine builders. In the accompanying illustration are shown two views of the stitch regulating mechanism of a well known knitting machine. As previously stated, changes in the stitch (in stationary cylinder machines) are made by raising and lowering the needle cylinder and sinker ring.

In this machine the needle cylinder is held upon another cylinder shown as the needle cylinder support, and is raised or lowered by raising or lowering the support rod B. As the cylinder drops by its own weight only in changing from a loose to a tight stitch, it must slide freely in its bearings, and this is also an aid in the transferring operation. To obtain the proper freedom of movement of the cylinder support it is necessary to file that part by which it is held on the rod B. It is also necessary by filing to level the cylinder, and have it so located that the circle formed by the needle hooks will be concentric with the latch sinker ring.

A machine having a needle cylinder out of level will knit a tube that is crooked, because the needles on the high side drawing longer loops than on the lower side will make their side of the tube longer, thus making it curved. When putting in a new cylinder or a new support this adjusting has to be tried until the cylinder will knit a straight tube. The curve may be removed by filing off the support on the convex side of the tube which lowers that side of the cylinder and shortens the stitches.

It is worth while to guage the needles used before making a test for determining the position of the cylinder. Gauging is done to learn whether all needles have the same length of shank, or, in other words, whether the distance from the butt to the hook is the same in every needle. As short needles will draw long loops the necessity for having them all alike may be readily seen. With the cylinder in position and working satisfactorily the adjustment of the machine is as follows:

(1) The collar C should be set so that when the cylinder is raised for transferring (by lever not shown on this sketch) the top of the needle hooks are about 1/16" above the crown of the sinkers.

(2) With the pattern drum in the position shown—or in some position where none of the cams G, H or L come under the stitch lever D—the desired stitch in the foot and ankle may be obtained by raising or lowering the support with the adjusting screw A, which forms a bearing for the support rod B. This fixes the stitch in the smallest part of the garment, and the other stitches—heel, toe and leg—are set in relation to this one.

(3) The pattern drum may be turned over by hand if the pinions on the main shaft are in the proper position. These gears should be so situated that when they are both revolving in the same direction the notches in which the clutch tooth fits come opposite each other. This position can be secured by turning the driving pulley until the gears come to the desired point.

(4) With the pattern drum in the starting position—i. e. with the point on the drum marked "S T A R T" under the presser springs of the stitch lever D—adjust the set screws M (Fig. 8), and the collar C so the outer end of the stitch regulating lever D has about 1/16" play. At this time all three of the set screws N-O-P are backed out of contact with the parts upon which they bear. It is through the lever D and the cams G, H and L that the proper length of loop is secured in the heel, toe and upper part of the leg. After adjusting the set screw M then slacken the stitch the desired amount by turning down the set screw P.

(5) The next thing is the adjustment of the heel and toe stitch made when the cams G and H, respectively, are

raising the stitch lever D by means of the spring and adjusting screw O. The adjustment of this loop must be made when the re-inforcing thread is running into the stocking and depends upon the size of the re-enforcing yarn. The stitch should be one that will show little or no change in the fabric at the point where the re-enforcing yarn begins and leaves off. A heavy re-enforcing thread requires a long loop and this is liable to cause cut and dropped stitches at the point where the change is made.

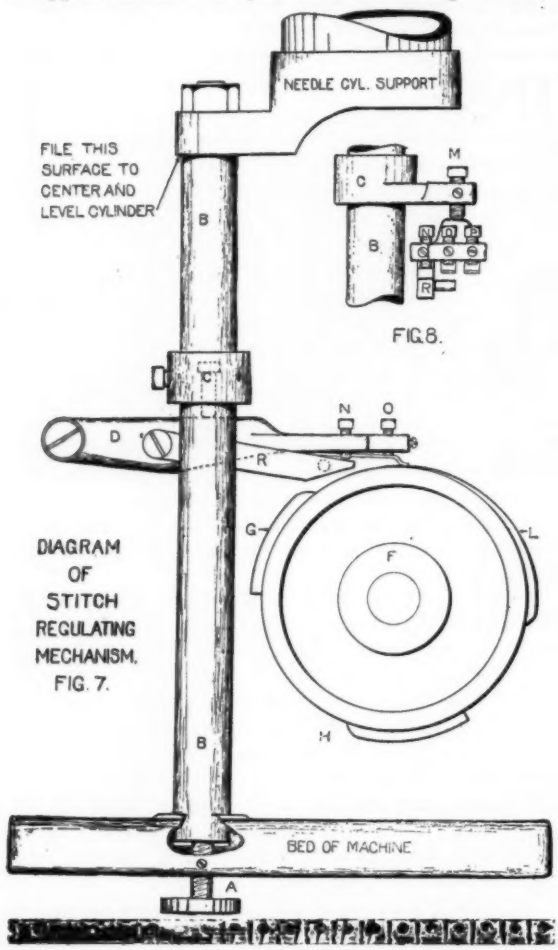


DIAGRAM OF STITCH REGULATING MECHANISM. FIG. 7.

(6) One other adjustment remains and the regulation of the stitch is complete. These machines, like all others, are driven at a slow speed when making the heel and toe, in order to reduce the shock upon the different parts of the head. The reduced speed is obtained by using a slow motion pulley, and the reduction takes place just before beginning the heel and toe.

A machine running at slow speed draws shorter loops than when running at high speed, even with the same adjustments. To prevent the machine from making a course of tight loops during the last revolution before making the heel, and, therefore, making the stocking too tight across the instep, the lever R is used. When the rounded point of the heel cam G strikes the pin in the outer end of lever R and raises it slightly the adjusting screw N should be set so that the stitch lever D is just slightly tightened—i. e. has no play.

This completes the adjustment of the stitch and the machine should produce a satisfactory fabric. The actual size of the loop made is in all cases a matter fixed by the judgment of the knitter. It should be remembered that a tight stitch, while producing a firm, close mesh fabric, may be carried to such a point that the purchaser will be unable to draw the stocking on over his heel without considerable difficulty. The finer the mesh the more courses are required in the stocking, and consequently with this fine stitch the production of the machine is reduced. On the other hand a loose stitch, while conducive to economy of production, does produce a garment that does not fit well, is loose and baggy where it should fit closely, and is of greatly inferior appearance.

PLATING DEVICE.

The accompanying illustrations relate to a plating device for a circular knitting machine.

In the knitting art the term "plating" is used to denote a method of knitting by which two yarns are simultaneously fed to and knit by the needles, with provision whereby the relation of the yarns to each other as they pass into the kniting operation is such that a predetermined yarn will be visible upon the face of the resulting fabric while the other yarn will be knit upon the back. In this way a knit fabric may be produced having uniformly a yarn of one color or character for its face, and a yarn of another color or character for the back.

It is further common in plating devices to provide means whereby at predetermined intervals, the two yarns thus simultaneously fed to the fabric may be so manipulated as to invert the position of the yarns in the knitting. By thus employing yarns of different color and changing their relation to the knitting at predetermined intervals various patterns may be produced.

In plating devices hitherto known, difficulty is often experienced in constantly maintaining the proper relative position of the two yarns under the varying conditions and contingencies of the knitting operation.

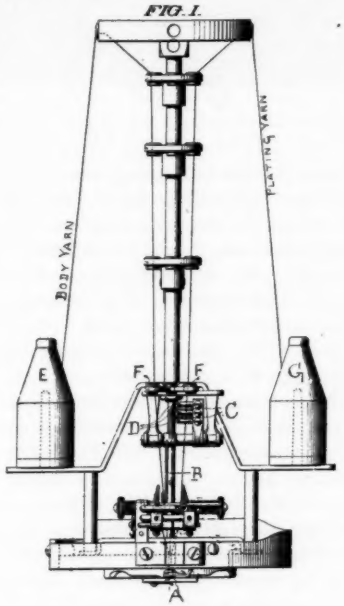
The yarn which forms the back of the fabric is called the body yarn ,and that which goes to the face of the fabric is called the plating yarn, and in the ordinary knitting machines plating is usually accomplished by so feeding the yarns that the plating yarn passes into the hook of the needle simultaneously with but underneath the body yarn.

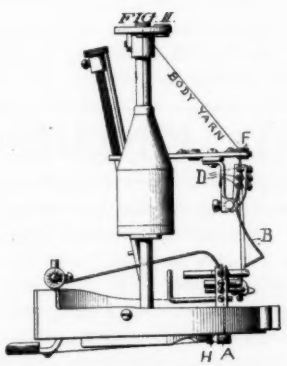
By reason of there being no room for special manipulation of the yarns between the yarn guide through which both yarns pass and the needles, it frequently occurs in practice that, without any apparent reason therefor, the two yarns will reverse their positions, throwing the wrong yarn to the face of the fabric and producing flaws in the work. This unintentional reversal of the yarns is usually due to accidental, but almost inevitable, changes of tension. For example yarn will occasionally catch as it reels off a bobbin; and there is a difference between the tension with which the yarn reels off a new bobbin and off one partially unreeled. These and many other unavoidable causes well known to knitters result in variations of the tension of the yarns, and notwithstanding the use of delicately adjusted tension arms, and the other well known devices, these accidental variations of tension are sufficient to frequently cause the plating operation to be defective.

To overcome this difficulty, the present means have been introduced which enable one, under all conditions ordinarily occurring in practice, to maintain constant the rela-

tion of the threads during the knitting operation and their proper relative tensions.

The means here employed maintain the proper relation of the plating yarn and body yarn, not only during ordinary circular or full knitting, but during what is known as reciprocatory knitting. It is a common feature in all stocking knitters, and in some other forms of circular knitting machines, that the machine, after knitting a continuous tube by rotation of the parts, ceases temporarily to thus operate and proceeds to knit for a time by a motion of reciprocation of the same parts, the most common instance of this being the formation of the heel and toe pockets in





PLATING DEVICE.

the knitting of stockings. In the ordinary stocking knitter it has hitherto been found impossible to so maintain the relative position of two yarns as that they will be fed in the same relation to the needles when the machine is reciprocating, because at the end of each stroke the reversal of the motion tends to invert the position of the threads.

According to the present scheme this difficulty has been overcome and one is enabled to plate as accurately during reciprocatory knitting as during rotary knitting. In this way an entire stocking can be knit, including the heel and toe pockets of two yarns, constantly maintaining one thread upon the face of the fabric and another thread upon the back.

Fig. I, is an elevation of a rotating latch guard with its thread guide and supports and their adjunctive parts, such as may be conveniently superimposed upon the knitting cylinders of any ordinary circular knitting machines. Fig. II, is an elevation of the lower half of the same parts shown in Fig. I, but viewed from a point at right angles to that from which Fig. I, is taken.

Of the parts thus described the more important portions for the purpose of the invention are the tension equalizer and the lower yarn eye *A*. The latter maintains a separation of the yarns as they pass through the yarn guide. The tension equalizer operates by the co-action of the tension arm *B*, and the alternating fingers *C* and *D*, and for the purpose of understanding its method of operation the course of the threads must be traced.

The bobbin *E* carries the body yarn, which after passing through successive yarn eyes, runs through eye *F*, and then passes through the terminal loop of the tension arm *B*. Thence it passes through the ordinary tension device. The plating yarn, on the other hand, which is to be knit on the face of the fabric, is led from the bobbin *G*, through a succession of eyes, but, after passing through the eye *F*, it runs between the fingers *C*, on the one side and the fingers *D*, on the other. Thence it passes down through the tension device in precisely a similar manner to the other thread, and passes down with the other thread through an eye, but instead of passing directly to the yarn guide *H*, it is led down through the supplemental eye *A*, and thereby caused to assume a lower position.

In plating it is ordinarily necessary that the body yarn be subjected to a greater tension than the plating yarn, this tension tending to hold the body yarn in the uppermost position as it passes to the needles. But it is equally essential that any substantial increase in the tension of the body yarn should be accompanied by a corresponding increase in the tension of the plating yarn, and this is the function which this device accomplishes.

EMPLOYMENT OF A TUBE OR STRING-WORK.

The method here illustrated relates to the manufacture of hosiery in which all or part of the leg portion is ribbed, involving the employment of a tube or string-work including both ribbed and plain sections, and a transfer operation from the plain sections of the string-work to the stocking knitter.

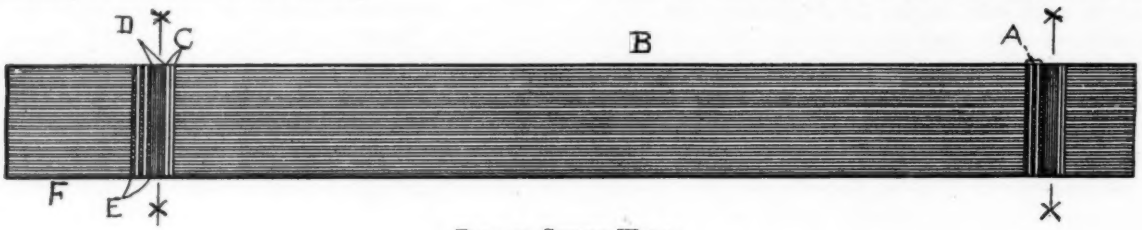
As a rule half-hose or children's long-hose, is provided with a ribbed top which is knit as a separate operation on a different machine from that upon which the body of the stocking is knit. These ribbed tops are knit in continuous succession on what is known as a "ribber." This is often called "string-work." Although it includes a certain number of "ravel courses," the entire string-work is ribbed fabric. The labor of transferring such ribbed work from the ribber on which it is knit to the cylinder of the stocking knitter or "footer," on which the remainder of the stocking is to be knit, is a considerable element in the cost of the stocking, owing to the fact that the needles of latter cylinder must receive not only loops formed by the cylinder needles of the ribber, but also loops formed by the dial needles, and furthermore some of the needles of the stocking knitter must receive more than one loop; for ribbed work to be sufficiently elastic, must be knit on a

greater number of needles than corresponding plain work. Thus it is common to knit rib-tops on a ribber having 176 needles and transfer these tops to a "footer" having but 136 needles; in which case forty needles must receive two loops.

It is an object of this method to reduce the amount of labor required of the toppers when placing such a stocking top upon the cylinder of a stocking knitter preparatory to knitting the remainder of the stocking.

This transfer operation may be performed in any one of several known ways, and must not be confused with the subsequent manual transfer operation to the cylinder of the stocking knitter. Then a strip *D*, of about one-half inch in length of plain knitting is produced. This strip may be knit with a cheap grade of yarn as it is to be cut and raveled.

Next the dial needles, which have been thrown out of



TUBE OR STRING WORK.

It is said that prior to this scheme no one had appreciated the advantage of forming upon a ribber as string-work both ribbed portions and intervening portions of plain knitting, and then transferring the ribbed portions to the cylinder of a stocking knitter by putting the loops of these intervening portions of plain knitting upon the cylinder needles of the stocking knitter. In this way the loops of the plain work with which the transfer operation is effected may be made to correspond to the number of needles of the stocking knitter, in which case the transfer operation consists in putting but one loop on each needle a comparatively easy manual operation.

The accompanying illustration represents a piece or section of a continuous tube of string-work as knit according to the methods here described.

In beginning a tube a strip *A*, of about one-half inch in length of welt courses is made by knitting two and tucking one on the ribber; then the requisite length of ribbed fabric *B*, for the top of the stocking is knit. This may be knit with a cheap grade of yarn. As it is the needles are mechanically transferred to the cylinder needles of the ribber during the knitting of loose courses *C*. operation during the plain knitting, are again thrown into action, and ribbed knitting is again produced, including another welt course *E*, knit similar to the welt course *A*. Then another ribbed top *F*, is knit and an indefinite succession of sections as described above. In utilizing this string-work for the completion of a stocking the tube is cut near each loose course in the plain knitted sections *D*, as on the lines, X X. The length of tube thus produced is placed by toppers on the cylinder of a footer having preferably as many needles as there are loops in the loose courses *C*, one loop of a loose course of plain knitting (*i. e.* a course succeeding the transfer of dial loops to cylinder needles) being placed on each needle of the cylinder of the footer, and the plain knitting following the loose course thus transferred being raveled out. The stocking is then completed on the stocking knitter in the usual way. While the number of needles in the machines may vary, there may be instanced the application of this method by employing a ribber having in all 272 needles. When all of the dial loops are on the cylinder needles of this machine, there will be 136 loops and the transfer may be made to a footer having 136 needles.

DYEING, BLEACHING AND FINISHING

CHEMICALS USED IN THE TEXTILE INDUSTRY.

BY FREDERIC DANNERTH, PH. D.

Lecture at the Kensington Institute of Philadelphia.
(*Reported Exclusively for* COTTON.)

PART I. (*Continued.*)

DYEING. CARBONATES.

Now that we have become acquainted with some of the impurities which are found in water it will be possible to observe and appreciate the injurious action which they exert in the dyeing process. Let us first consider lime and magnesia. These substances, known to the chemist as alkaline earths, are especially harmful if present as bicarbonates. In this form they impart to the water an alkaline nature, and as they are not very stable compounds they react with the dyestuffs in many instances to form "color lakes." These lakes being insoluble compounds are only partially taken up by the fiber with the consequent production of dyespots and clouded dyes. When using basic dyestuffs the dyer seeks to render these bicarbonates harmless by adding acetic acid. This must be done judiciously as an excess of acetic acid retards the dyeing process considerably, the fiber having little affinity for the dye in acid solution. In some cases soap is added to the bath for the purpose of brightening the color, but here again the presence of lime interferes. The color bases which are thrown down by calcareous water invariably result in a spotting of the goods. The shade produced on the fiber will differ more or less from the pure dye as the lakes in question have a color different from the dyestuff. The lake being only superficially deposited causes the effect known to the dyer as "crocking."

ORGANIC IMPURITIES.

The other important impurity which becomes especially noticeable when dyeing pale shades is the suspended matter, commonly designated as dirt. This suspended matter forms a large percentage of the Schuylkill water

about Philadelphia, most of the time. Many dyers have thus been compelled to install filtering plants in their works. Now a filter will remove the dirt and other insoluble matter, but is of no use whatever in removing the soluble salts so that this method does not suffice for water which is to be used in connection with soap. Organic impurities act very injuriously on many coloring matters—especially alizarin blue, their fixation being thereby prevented. In the case of iron we will observe that there is a great tendency toward the formation of a black "ink" in the fiber when the goods are immersed in the sumac bath. Moreover, the iron-alizarin lakes are much darker than the aluminium-alizarin lakes so that in the dye-bath, shades would be obtained varying in dullness according to the amount of iron present. It is for the same reason that the other chemicals used in this process must be practically free from iron. On the other hand the water used in the dyeing of turkey red should contain a certain amount of lime salts in order to make possible the formation of the aluminium-lime-alizarin lake. If the water is too soft a certain amount of chalk (whiting) or acetate of lime is added. If too little lime is present a poor shade of red is obtained and the dye-bath is not exhausted while an excess of lime produces dark, dull shades. Excellent results are obtained with water of the hardness of nine degrees (French), (5 German). If the water is too hard it must be previously softened with acetic acid. The carbonates of lime and magnesia are thereby converted into acetate of lime and acetate of magnesia, and the formation of the dyestuff-lake in the bath is prevented. If the dyestuff-lake is formed in the bath the fiber and yarn receive very little of it, and that which is taken up, is improperly fixed. The amount of acetic acid which should be added to the water may be determined in the laboratory by titrating 1,000 cubic centimeters of the water with deci-normal hydrochloric acid, using methyl orange as an indicator. The number of cubic centimeters of this acid used to neutralize the water is then calculated to acetic acid by means of a table. Thus, in one instance, 10 cubic centimeters of hydrochloric acid may be required to neutralize one liter (1,000 cc.) of water. From the table we then ascertain that 100 liters (26 gallons) will require 13 grams of commercial 50 per cent. acetic acid. The water used in the final operations of clearing and brightening turkey red should also be soft, for, if lime soaps are formed, these will impart a pale gray bloom to the red so that the brilliancy of the color is almost ruined.

PURE WATER.

In the bleaching process the presence of iron compounds will give rise to "rust spots," and lime will give the goods a harsh feel owing to the deposit of gypsum which is formed on the fabric in the "sour" bath. Even in those cases in which muriatic acid is used for the souring operation the lime soaps may be formed in the final soaping operation which is used for softening the goods. If a water contains suspended matter the dyestuff may be precipitated, that is, thrown down in an insoluble form, or, if a pale shade is being dyed, dirty colors will result.

To review briefly the operations which demand a pure water we may mention the scouring of wool, the bleaching of cotton and linen, the boiling off of silk, and the weighting of silk, in which the "scroop" and the "feel" depend so largely on the quality of the water used. Furthermore, we may mention the fulling of woolens, the dyeing of alizarins and turkey red, in particular, and the dyeing of wool with basic dyes. If a woolen yarn has been scoured with a "hard" water a deposit of lime soap will be formed on the fiber and when this yarn is taken to the dyer the dyestuff will be deposited upon this lime soap so that the effect of "crocking" is produced.

BAD EFFECTS OF IMPURITIES.

To review briefly the bad effects of the several impurities:

Lime: Precipitates the dyestuff; alters the shade of the dye; causes crocking; produces a harsh feel; consumes soap, and interferes with proper scouring.

Iron: Causes dull reds; ink spots, and rust spots.

Suspended matter: Precipitates the dyestuff, and causes dirty shades.

METHODS FOR ANALYZING WATER.

After having found which qualities are desirable in a water used for textile purposes we naturally turn to find methods for determining these qualities, or for analyzing the water. The test for the presence of iron in water by means of potassium sulphocyanide has already been given. Soluble lime salts if present in water may be detected by first concentrating the liquid and then adding a few drops of ammonium oxalate solution. A white crystalline precipitate insoluble in acetic acid indicates the presence of lime salts. To determine the presence of magnesium compounds the concentrated liquid is treated with ammonium chloride, ammonium hydroxide and sodium phosphate. Magnesium if present will appear as a white crystalline precipitate. The amount of each impurity present may be determined first by weighing the precipitates obtained from measured volumes of water, or second by observing the amount of acid required to neutralize the carbonates and afterward observing the amount of sodium carbonate required to precipitate the sulphates. The acid solution and the sodium carbonate solution must for this purpose be made up to a definite strength and are then called standard solutions. This method was devised by Hehner. Another method and one which is better adapted to determine the suitability of the water for textile purposes is that devised by Clark. It depends on the fact that hard water makes impossible the formation of a lather with ordinary soap. Not until after all the lime has combined with soap are we able to raise a lather. It is a process of precipitation by means of a standard solution of soap. The soap which may be considered to be potassium oleate, interacts with the calcium and magnesium salts present in the water with the precipitation of calcium and magnesium oleates. By its property of causing a lather to form, as soon as the lime salts have been rendered insoluble, the soap solution serves as an "indicator" as it were. So long as the hardness producing salts are undecomposed by the soap solution no lather is formed on shaking the mixture. The appearance of a permanent lather indicates at once that the soap solution is in excess. The total hardness (due to the carbonates) is first determined, after which the permanent hardness (due to sulphates) is determined. The temporary hardness is removed by boiling the water thoroughly, and subsequently filtering, whereby the insoluble carbonates are separated from the water. By subtracting the permanent hardness from the total hardness we ascertain the amount of the temporary hardness.

In view of the great importance of knowing the value of a water supply, I feel that the details of the analysis should be given in this case if in no other. Two standard

solutions are necessary and these may be prepared according to Newth as follows:

Standard postassium oleate solution. Seventy-five grams of a pure olive oil soap are dissolved in a mixture of equal parts of alcohol and water enough to bring the total volume to 300 cubic centimeters. Allow to settle for one day then pour off into a stoppered bottle.

Standard calcium chloride solution. This solution contains 0.222 grams of calcium chloride per liter. Fifty cubic centimeters of this solution will destroy (precipitate) as much soap as will 0.01 gram of calcium carbonate (chalk). It may be prepared by weighing out exactly 0.2 gram of pure calcite and dissolving this in a platinum dish by means of hydrochloric acid, a cover is placed on the dish in order to prevent loss during the effervescence. Finally the solution is evaporated to dryness on a steam bath. The residue is then treated with water and the solution again taken down to dryness. The process should be repeated twice in order that no trace of acid may be left in the dish. The residue is finally, carefully washed into a graduated liter flask, and filled up to the mark with water. Fifty cubic centimeters of this standard solution are transferred to a stoppered bottle of 250 cubic centimeters capacity by means of a pipette. (The contents of the pipette must not be blown out by the breath as the carbon dioxide thus introduced would affect the soap solution.) The soap solution is now allowed to drop into the bottle from a burette, one cc. at a time, and the contents of the bottle briskly shaken after each addition. As the point is approached when a lather is raised a smaller quantity of the soap solution is added each time and the process continued until the lather remains permanent for two minutes, the bottle being laid upon its side.

From the preliminary test we must now calculate the amount of water which it is necessary to add in order to make the soap solution so strong that exactly 14.25 cc. will be required to produce a permanent lather with exactly 50 cc. of standard calcium chloride solution. The soap solution is accordingly diluted with a mixture of alcohol and water. A little less than the calculated amount should be added, because it is very easy to add more water if it should still be too strong. If the solution has been made too dilute it will have to be prepared afresh. Let us say it has been diluted to such an extent that 13.5 cc. of soap solution are needed to give a lather with 50 cc. of the calcium chloride solution. The soap solution is now allowed to stand in a stoppered bottle for one day. Pour off the liquid from any sediment which may have formed and repeat the titration against 50 cc. of the chloride solution. Finally adjust to the exact strength given above.

If 50 cc. of a sample of water be now titrated with this standard soap solution, each 14.25 cc. used will indicate the presence of 0.01 gram of calcium carbonate. This is equivalent to 0.02 gram in 100 cc. of water (or 100 grams of water). This is stated by chemists as 20 parts per 100,000, or 20 degrees French Scale.

The hardness scales used in the several countries differ slightly as will be seen from the following table:

French 1 degree = 1 part calcium carbonate per 100,000 parts water.

U. S. 1 degree = 1 grain calcium carbonate per U. S. gallon of water.

English 1 degree = 1 grain calcium carbonate per Imp. gallon of water.

German 1 degree = 1 part calcium oxide per 100,000 parts water.

Of these scales the "French" is by far the most rational as by multiplying it by ten we at once have parts per million, for instance, 1.43 degrees French is equal to 14.3 parts per million.

The four scales cited may be converted by means of the following table:

French	U. S.	English	German
1.79	1.03	1.25	1.00
1.00	0.58	0.70	0.56
1.43	0.83	1.00	0.80

In estimating the total hardness in water, 50 cc. of the water are introduced into the stoppered bottle as directed in the preceding, and briskly shaken. The soap solution is now added one cubic centimeter at a time shaking briskly after each addition. As the operation proceeds it will become easier to raise a lather, the soap solution should therefore be added drop wise until a lather is obtained which lasts for two minutes when the bottle is placed upon its side. The volume of soap solution used is now read off the burette and the degree of hardness ascertained from the table. If more than 16 cc. of the soap solution are required to raise a lather the experiment must be repeated. This time 25 cc.. of the sample are taken and mixed with 25 cc. of distilled water from which the carbon dioxide has been recently removed by boiling. The degree of hardness found from this determination is doubled in order to ascertain the true degree of hardness of the water.

In estimating the permanent hardness in water, 150 cc. of the water are placed in a 500 cc. flask and counterpoised upon the rough balance. The water is gently boiled for thirty minutes in order to decompose the bicarbonates and thus cause the carbonates to precipitate. It is then cooled well and placed upon the balance. Cold fresh distilled water is now added to restore the original weight i. e. to replace the water which was driven off during the boiling. The water is filtered through a dry filter and fifty cubic centimeters of the clear filtrate titrated with the standard soap solution as in the previous case. By subtracting this result (permanent hardness) from the total hardness the temporary hardness is ascertained.

THE NOMENCLATURE OF DYESTUFFS.

Part I.

Lately the question of the rational naming of dyestuffs has been much debated and from many points of view. That the present nomenclature is unsatisfactory in many respects is hardly the fault of the color firms; it is the inevitable result of uncontrolled individual action and the absence of guiding rules agreed to all round. To begin with, in fact, the color makers were in the position of so many Adams and Eves; they had a good deal of naming to do and only their own inventiveness to rely on. It was clearly necessary that a trivial name should be given to each dyestuff; outside the laboratory the chemical names were impossible. Perkin was very severely scientific, but he did not expect his customers to remember the formula of Mauveine and ask for it accordingly. Consequently it obtained a commercial name, or rather at least sixteen different commercial names, and this prodigal profusion of appellations is one bad result of the want of combined action and the lack of a central authority.

NAMING DYES ACCORDING TO COLOR GIVEN.

One would suppose by the terminology of the time

that Perkin's dyestuffs was a sort of chameleon; it was called indifferently Mauve, Violet, Rosalan or Purple! No wonder with this waste of terms that a writer as early as 1860 remarked that the chemists were getting hard up for names for their colors. This was apropos of Crace Calvert's oxidation products of aniline, which he called Emeraldine and Azurine. The early nomenclature in fact seemed to follow this plan of naming the dyes according to the color they gave, and although Latin and Greek were freely drawn upon, even unto such poetical names as Iris, the rainbow, and Eos, the blush of dawn, it is evident that this source was not productive enough. The artificial dyestuffs have increased and multiplied and the difficulty of appropriate nomenclature has increased in proportion the more so that fresh difficulties have cropped up which are touched upon in a very interesting debate between M. Emile Blondel and Leon Lefevre.

A RATIONAL NOMENCLATURE NEEDED.

M. Emile Blondel notes that the difficulty of nomenclature has had several bad results. Although an exact knowledge of the old natural dyes, whether mineral or vegetable, demands considerable study on the part of the dyeing experts it is no exaggeration to say that the difficulty of acquiring a competent knowledge of dyes, which includes many subdivisions, such as their relations to various fibers and processes, has enormously increased with the introduction of coal-tar colors. In fact the difficulty increases in geometrical proportion with the progress of chemical research among organic coloring matters. The complexity of the subject has now reached such a pitch that it may well be asked how future generations shall be able to classify the various dyes, to use them judiciously and not to neglect more of them than is absolutely necessary. So many new dyes have hitherto been neglected for various reasons that it is possible that these very products may later on have a commercial value, either as leading up to fresh discoveries or as being capable of improvement in themselves. There is consequently a crying need of a rational nomenclature which will allow if not an absolute identification between different makes, yet a logical and immediate association with the original grouping.

It would appear that at the commencement of the artificial dye manufacture more care was taken to give the same names to the same dye, wherever made. It was found quite natural to use such names as fuchsine, ethyl or methyl violet, methylene blue, eosine, erythrosine, phloxine, ponceau, croceine, orange I, II, III, etc. (although a few synonyms were hazarded tentatively) to similar products wherever made.

In this way alizarine and its derivatives have always retained the original and fairly rational designations adopted at first, and it is only since the number of elements of coloration has increased that it has been supposed obligatory to complicate the designations at pleasure so as to make them less clear.

We had the triphenylmethane dyes, the basic class, the phthaleines, alizarine and its derivatives, and the sulphoconjugated azo-dyes. Then came the substantive dyes. Starting with Congo Red every manufacturer thought himself obliged to invent a name differing from the others, at least in a prefix, for each of his imitations and of his new products. We thus had the diamines, the oxydiamines, the oxydiaminogens, chlorantines, dianils, zambesis, oxamines, diphenyls, polyphenyls, primulines, naphthamines, etc. Another series, which started with Cachou de Laval, gave rise, after a long period of inaction, to the sulphur dyes. Then we had at once immedials, katigens, pyrogens, thiogens, kryogens, thionals, etc., etc.

CLASSIFICATION HINDERED BY FANCY NAMES.

All this shows that proper classifications, although perhaps not made impossible, is immensely hindered by the multiplicity of fancy names, which seem to have for their sole *raison d'etre* the idea under-running scientific nomenclature in general, that is to say, their object is to express in terms derived from the classical languages some among the properties of the individual substances.

The new dyes issued daily from the dyeworks are the result of scientific study and research. They appeal on the whole to people sufficiently educated and careful, and even jealous of the history of their profession or art, to justify any arrangement which would assist commercial transactions and at the same time facilitate methodical classification and the identification of the products daily submitted to the colorists, who have to judge of their value from three standpoints, that of their properties, that of their cost, and that of the uses to which they can be applied.

OLD DYES LABELED AS NEW DYES.

M. Blondel remarks that it is often a disagreeable experience to find such a mixture of old dyes labelled as a new dye. It is possible that such mixtures may be required for certain purposes, but that is no just reason for offering as a novelty a mixture of substances which are within everybody's reach. The large dye-making firms, he urges, would render a real service to the great industry which they supply, if they would confine themselves to selling either homogeneous substances or mixtures described as such. The questions of affinity, solubility and penetration are assuming more and more importance every day and make the correction or modification of one dye by another a matter of constantly increasing delicacy. In the presence of a restricted number of homogeneous and well classified dyes they can be judiciously employed. On the other hand in the presence of complex dyes sometimes examined in haste on account of their numerical strength real difficuties are experienced and much time is lost. It must not be forgotten that the new dyes are adopted solely by reason of their valuable properties, and that these properties are best in evidence when the dye is pure and free from admixture. It would be desirable to submit the question to an international congress.

EXIGENCIES OF THE TRADE.

M. Leon Lefevre says that as regards principles everyone will gladly agree with M. Blondel, but as regards practical work the reform demanded is, so to say, unrealizable. Of this impossibility, or difficulty if you like, results partly from competition among dyemakers, it has none the less other causes due to the exigencies of the trade, and perhaps also to want of knowledge on the part of dyers. The problem is too complex for solution by

one congress. Many years and many congresses would be wanted.

If we examine M. Blondel's arguments we shall see that they contain controversial matter, and that some of his assertions are, perhaps, rather too absolute. For example he talks of "imitations" of Congo Red. The word is inaccurate. In reality the diamine and oxydiamine dyes and other direct cotton colors actually belong to the Congo Red family, but they differ from that dye in being derived from different bases. Thus, Congo Red is prepared from benzidine, Diamine Red from ethoxybenzidine, Sulphocyanine from sulphosulphonated benzidine, etc. All these dyes have doubtless similar properties, but they are different dyes nevertheless. Hence it is useful to give them special appellations. The same observations may be made about the sulphur dyes. They, of course, form a special group, but every maker employs different raw materials, and the katigen dyes, for instance, although possessing properties more or less similar to those of the immedial dyes, differ from them notwithstanding in certain essential respects.

EFFECT OF INDUSTRIAL PROPRIETORSHIP.

Again, the laws regulating industrial proprietorship may have an influence on the nomenclature. In Germany, for example, the patent law protects not the substances themselves, but the methods of manufacturing them. The result is that the same dye can be patented by different firms, provided only that they make it by different methods. It happens, too, sometimes that it may be to the interest of a firm to give to a dye a name different from that adopted by a rival, even if the former firm has a priority in the manufacture.

In certain countries a product may be made the property of the maker by his registering a name for it. Thus antipyrine can be made in France, but cannot be sold there under that name, which is the property of the Knorr firm. If the name Congo Red had been registered, no one but the man who registered it could have used it. In these cases then the law makes it impossible to designate any given product by an original commercial name. Each maker must have his own. In their circulars the dyemakers indicate the nature of their dyes as basic, acid, etc., and very often their chemical positions as well, by such epithets as azo, triphenyl, methane, indanthrene, etc.

HOMOGENEOUS DYES.

As regards dye mixtures, under whatever name they may be sold, M. Lefevre allows that there are certainly abuses, but the dye-chemist can defend himself against them by refusing to deal with any dyemaker who, in spite of orders to the contrary, persists in delivering mixtures to him without notification of their nature, and as if the goods were homogeneous dyes. But here a difficulty of definition arises. What is a homogeneous dye and is it possible to supply regularly a homogeneous dye of exactly the same shade and the same productiveness? It is common knowledge that their manufactured, however well it may be carried out, never gives exactly the same product all the time. This is especially the case with dyes considered to be homogeneous, and which are nevertheless mixtures, such as Paris Violets, Fuchsine, etc.

As the dyer quite properly demands from his dye supplier a product which is the same for every consignment, the latter is compelled to realize that result by correcting the unavoidable deviations which his product manifests from the dyers' type by the addition of other dyes. This is done every day by every dyemaker. Can this corrected product be regarded as homogeneous dye? The question is really what proportion of admixture can be allowed for shading purposes? M. Blondel would reply that the dyemakers themselves must be induced to avoid mixtures altogether. M. Lefevre remarks that they would like nothing better, at least the most important among them, but that they are compelled to suit their customers.

M. Lefevre concludes by remarking that the members of the great industries of dyeing and printing would be glad to see more uniformity in the commercial nomenclature of dyes, but that they can well take care of themselves by making strict demands upon their suppliers of dyes. It does not follow that M. Blondel's ideas cannot be followed up. But the problem is so complicated, so bristling with difficulties of all kinds, that its solution is far off. The first thing wanted is an intimate and continuous exchange of ideas among those interested, viz., dyers, printers, dyemakers and chemists. So long as this interchange of ideas does not exist it will always be easy for dyemakers to christen their dyes by whatever names they choose, without any regard to anybody else's convenience.—*Herbert Robson in the Dyer and Calico Printer.*

UNEVEN CLOTH.

BY ERNEST MIDGLEY.

Uneven cloth is one of the difficulties that an overseer of weaving has to give very strict attention to. The rope on a friction let-off often causes trouble, as it will become sticky on damp days and not allow an even motion to the warp beam; and the weaver dropping oil on the rope, with the idea that it will make the warp beam work more freely, tends to make it worse, as the oil on the rope soon collects dust and lint, requiring the rope to be taken off and cleaned. Powdered black lead is about the best of all the remedies for a sticky rope. It costs the most, but it gives the desired effect.

A weak spring behind the let-off pawl will cause uneven cloth. When the lay moves forward, taking with it the connecting rod that gives motion to the pawl that turns the ratchet on the let-off, the spring behind the pawl, if weak, allows the pawl to slip by one or two teeth, thus allowing the yarn to be let off unevenly.

Care should be taken in setting the take-up gears, for if they are set too deep, they will lock. Should the gears not be deep enough in mesh with each other, they will have a tendency to slip occasionally.

Another cause of uneven cloth is the small pinion gear on the let-off being set so deep in the teeth on the beam, that if there is a small chip between the teeth of the beam flange that has not been cleaned out the beam will jump.

When both friction and gear let-off is used for fine work, it is considered best not to have the whip roll oscillating to its extremes as this is liable to cause thin places by allowing too much movement of the yarn.

What can be done in the way of fast dyeing is well shown in military uniforms and in the upholstery of railway carriages.

MARKET REVIEWS.

COTTON MARKET.

BY H. & B. BEER, NEW ORLEANS.

In our previous letter of a month ago we stated that the price of cotton at that time was relatively cheap compared with values ruling at the corresponding time of last year and year before, quoting middling, New Orleans, at 9¼ against 10¾ and 10 11/16, and thought spinners would do well to continue buying and not depend upon the uncertainties attending the making of a new crop. Our reasons for having favored buying of cotton were based entirely upon prospects of trade improving and the lack of winter rains in Texas. During the interim there has been an advance of 1 1-16, or 106 points, in the value of middling cotton in this market, to-day's quotation being 10 5-16 compared with 10 3-16 last year and 10¾ year before last. The cause for the advance was the settlement of the Balkan troubles, followed by a revival of business and the lowering of discount rates in England and on the continent of Europe, the Bank of England having reduced its minimum discount interest rate from 3 per cent. to the very low rate of 2½ per cent., business having been ever on the mend since.

Meanwhile the dry weather, upon which we have constantly dilated since the opening of the new year, was at last taken seriously by the trade, the cotton world having been convinced that not only was Texas in need of immediate generally heavy rains, but that preparations for the new crop in the southern portion of the States, owing to the dry weather preventing planting and germination of the seed, were three to four weeks late. During the early part of April rather good rains were had over the southern part of Texas, which permitted the resumption of planting operations, and while scattered rains were had in the same territory during the latter part of this month, there was no rain of consequence in the central, northern or western parts of the State, and, as a result, the drouth area is spreading. Central Texas, the heart of the cotton belt in the State, is now complaining bitterly, and some uneasiness is entertained lest the same conditions befall the northern portion unless sufficient moisture be provided in the very near future. As a matter of fact the whole State would be benefited by a generally heavy rain.

The following will give an idea of existing conditions in Texas: "Waco, April 16, central Texas is very dry, planters are beginning to complain bitterly on account of no rain, but little planted, and where cotton was up on the 12th inst frost 'nipped' a large per cent. and further the continued dry weather is causing the growing plant to 'curl.' In western Texas practically no rain during the winter, with no change for the better thus far, though, in this section, they say, one good rain means the making of a crop. Northern Texas, where, early in the spring, the best rains fall, has time to recover, it being early yet for planting there. While Texas conditions to-day, as a whole, look gloomy, with reasonably heavy rains (not floods), sentiment would quickly change. The acreage will undoubtedly be increased, which may somewhat offset the lateness. A large crop is not to be expected unless we begin shortly with ideal weather, and it is continued."

At the moment there is no sign of relief, and unless generously well distributed rains occur higher prices may be expected, probably much higher if the situation be not relieved by May 1st., as next month, fair, not wet weather will be required in all sections of the belt to permit cultivation of the growing plant.

Other sections of the belt, however, are in good shape. The Mississippi Valley and South Atlantic States having made favorable progress in new crop preparations, especially southern Alabama and southern Georgia, and while there will probably be a decrease in acreage in Louisiana and Mississippi on account of the weevil, it is not probable that there will be a reduction in the area devoted to cotton in the South Atlantic States.

The reason that so much importance is attached to conditions in Texas is because it is a State of great extremes, and because of its producing about 30 per cent. of the entire crop of the South. Present indications favor a moderate, perhaps a short crop, which would mean 2,500,000 to 3,500,000 bales. Year before last Texas marketed only 2,221,000 bales under conditions alike to those thus far this year, whereas in the year before last, the State marketed 4,050,000 bales owing to a large yield under favorable weather conditions throughout the year.

THE COTTON YARN MARKET.

The market during the past month has been a peculiar one, with a constant downward tendency. A great many of the mills who took orders some time ago, have been running out of work and have been pressing their yarns for sale. Stocks have been increasing and heavy shipments arriving. The holders have been closing them out at the best prices obtainable in order to turn them into cash and avoid carrying charges, with the prospect of taking as low, if not lower, prices later.

The trade has covered its wants ahead for sometime, and is not anxious to anticipate its wants. On the other hand, the advance in cotton during the past two weeks, has made it difficult for the mills to get even cost. There has been some export business on sheetings, and also some business placed with the converters, but, as a rule, trade in cotton goods of all kinds, from the retailer to the spinner and weaver, has been dull and heavy.

On certain lines of specialties, there is a good demand, and fair prices have been obtained, but where orders have been taken to extend ahead, it has been at low prices, many of the mills having made up their minds that they would run their plant full and would accept orders with no profit, rather than take the risk of shutting down later.

There are large stocks of all kinds of yarn on hand in the various markets as well as at the mills, and while the spinners are not anxious to contract far ahead at present prices, at the same time, neither are the consumers. It must be borne in mind that we are now at the height of the season. In a few weeks more we commence to come into the midsummer dullness, when the mills shut down for repairs, vacations, stock taking, etc., in fact, the dullest two months of the year.

Though there is a slow but steady improvement, it looks as if conditions were going to be unsatisfactory until after the turn of the year for fall business. We hope by that

time that labor in other lines of industry will be employed, and when it is the mills will be in a position to purchase supplies which will have its effect on the cotton market.

The speculations in cotton have hurt the spinner, as prices for cotton have not advanced in proportion to those for yarn.

Advices from abroad show the condition of the cotton industry in England and the continent even worse than in this country.

SOUTHERN SINGLE SKEINS.

4s to 8s	14½@15	22s	17 @18
10s to 12s	15 @15½	26s	18 @18½
14s to 16s	15 @16	30s	20 @21
20s	16½ @17		

SOUTHERN TWO-PLY SKEINS.

4s to 8s	15	30s	19½@20
10s to 12s	15 @16	36s	22 @24½
14s	15½@16	40s	23½@24-25
16s	16 @16½	50s	29 @30
20s	17½@18	60s	35 @36
24s	18 @18½	8-ply 8s upholstery	15
26s	18½@19	4-ply 9s upholstery	15

SOUTHERN SINGLE WARPS.

8s to 10s	15 @16	22s	17½
12s	15½@16	26s	18½@19
14s	16	30s	20
16s	16½	40s	23 @25
20s	16 @17		

SOUTHERN TWO-PLY WARPS, ETC.

8s to 10s	15	26s	19 @19½
12s to 14s	15½@16	30s	20 @20½
16s	17	40s	24
20s	17½@18	50s	31
24s	18½@19		

SOUTHERN FRAME PEELER CONES.

8s	15	20s	17¼@17¾
10s	16	22s	18 @18½
11s	16½	24s	18½@19
12s	16½@16¾	26s	19 @19½
14s	17	30s	20½
16s	17¼	40s	23½@24
18s	17½		

THE KNIT GOODS MARKET.

There is very little of interest to be said regarding the knit goods market for the last month, and what business has been done has consisted almost wholly of small orders, many of which were duplicates, mostly those relating to light-weight underwear, which, however, require the advent of warm weather before much interest can be expected as coming from retailers.

Much less talk is being heard nowadays of delays in deliveries, and it is evident that mills have caught up with their orders for spring deliveries, though we hear of occasional exceptions where buyers find it difficult to procure their goods at the time they were ordered to be delivered.

Buyers are sending forward orders for lines of balbriggans for immediate shipment, most of which are for women's wear, but the supply in hand is abundantly sufficient to meet all demands.

Light-weight union suits are in good request, but the particular wants of the buyers are oftentimes difficult to satisfy. This is largely due to the fact that buyers were in the market for this class of goods a few weeks ago, and cleaned up the market pretty thoroughly, and left but few goods available for quick shipment. Most of these orders come from the Pacific Coast localities, and from the Southern States, the weather in the Northern States not being warm enough to create a demand for this kind of goods.

Many duplicate orders are being received or reported for the fall trade. Some manufacturers are disposed to be optimistic regarding cotton fleeced lined underwear. There are some, however, who profess concern as to the amount of stock in the hands of retailers and the quantity that will be carried over into the next season. This latter uncertainty is due largely to the fact that last winter was an usually mild one in most sections of the country, and, consequently, few goods of this character were moved from

SOUTHERN COTTON MILL STOCKS.

Quotations by F. C. Abbott & Co.,

Charlotte, N. C.

	Bid	Asked		Bid	Asked
Aiken Mfg. Co.	75	85	Lanett	97	...
American Spinning	145	...	Langley Mfg. Co.	90	95
Arkwright Mills	...	...	Linden, N. C.	...	97
Arlington	...	166	Limestone	140	...
Avondale	...	...	Loray, pref 1901	...	96
Augusta, Ga.	60	...	Lowell	...	...
Bonnie	121	...	Mooresville, N. C.	125	...
Bloomfield	...	118	Lumberton	...	226
Brandon Cot. Mills	145	...	Mills Mfg. Co.	...	104
Brookside	...	103	Modena Mills	...	115
Capitol City, pref.	...	78½	Mollohon	...	105
Chadwick-Hoskins Co.	...	100	Monarch, S. C.	...	102
Clara	...	121	Newberry	...	146
Clover	...	...	Nakomis, N. C.	...	156
Clinton	...	...	Olympia, 1st	...	86
Clifton, pref.	...	104	Ozark	125	150
Cliffside	165	...	Patterson	115	...
Chiquola Cot. Mills	130	...	Piedmont Mfg. Co.	...	171
Cherokee Mfg. Co.	...	...	Pelzer	...	152
Converse	...	...	Pell City, com.	...	95
Dallas Mfg. Co., Ala.	95	...	Pell City, pref.	100	...
Dillon	65	68	Saxon	...	126
Efird, N. C.	125	...	Sibley, Ga.	60	...
Elmira, pref.	96	...	Social Circle	99	...
Eagle & Phoenix	...	121	Spartan Mills	...	130
Easley	150	155	Springstein	...	...
Edenton, N. C.	...	...	Statesville Cot. Mill	107	...
Exposition	...	240	Trenton, N. C.	...	...
Fairfield	75	...	Tryon, N. C.	...	143
Florence, N. C.	...	181	Tuscarora	115	...
Gaffney Mfg. Co.	...	75½	Tucapau, S. C.	200	...
Gaston	...	110	Toxaway	...	92
Gainesville	49	...	Union Buffalo, 1st pref	55	65
Gibson	80	...	Union Buffalo, 2d pref	14	...
Graniteville, S. C.	160	168½	Victor Mills, S. C.	...	125
Gray Mfg Co.	121	126	Warren Mfg. Co., pref	103	...
Grendel	...	119	Washington Mills	28	30
Greenwood	...	71	Washington Mills, pref.	...	108
Highland Park	...	170	Watts	...	92
Hartsville, pref.	100	...	Wareshoals	...	...
Hartsville	...	...	Whitney	...	125
Inman Mills S. C.	...	107	Wiscassett	125	...
Kesler	125	...	Woodside	...	103½
Jno. P. King Mfg. Co.	91½	...	Woodruff	...	124
Lanaster, com.	125	...	Williamston	...	108

NEW ENGLAND MILL SHARES.

FALL RIVER MILLS.

By H. M. Haffards & Co., Fall River, Mass.

	Bid	Ask		Bid	Ask
American Linen Co.	125	125	Merchants' Mfg. Co.	116	117½
Arkwright Mills	105	107½	Mechanics' Mills	...	115
Barnard Mfg. Co.	...	114	Narragansett Mills	...	142
Bourne Mills	98½	100	Osborn Mills	113½	...
Cornell Mills	182½	...	Parker Mills	99	...
Chace Mill	137½	142½	R. Borden Mfg. Co.	182½	...
Davol Mills	102	105	Seaconnet Mills	...	92½
Davis Mills	132	...	Shove Mills	93½	95
Flint Mills	106	...	Stafford Mills	...	116
Granite Mills	152	155	Stevens Mfg. Co.	90	...
Hargraves Mills	104½	...	Tecumseh Mills	...	150
King Philip Mills	...	175			

NEW BEDFORD MILLS

By Sanford & Kelly, New Bedford, Mass.

	Bid	Ask		Bid	Ask
Acushnet Mills	325	345	Nonquitt Spinning	123	124
Bristol Mfg. Co.	...	145	Page Mfg. Co	120	...
Butler Mill	153	...	Potomska Mills	130	...
City Mfg. Co	250	258	Pierce Mfg. Co.	350	...
Dartmouth Mfg. Co.	252½	...	Soule Mill	160	...
Gosnold Mills pf	106	110	Taber Mill	192	...
Grinnell Mfg. Co.	210	220	Wamsutta Mills	135½	...
Kilburn Mill	160	...	Whitman Mills	150	...
Manomet Mills	135½	137			

OTHER NEW ENGLAND MILLS.

By Philip M. Tucker, 35 Congress St., Boston.

	Latest	Previous		Latest	Previous
Appleton	152½	148	Great Falls	199¾	200
Amoskeag	300¼	304	Hill	125	120
Androscoggin	188	183	Jackson	997	960
Arlington	145	145	Lancaster	141½	140
Atlantic	80	78¼	Lawrence	171½	170
Bates	250½	220¾	Lockwood	101	101¾
Boston Mfg. Co	46	46	Lyman	120½	116½
Boston Duck	1325	1275	Massachusetts	135	135½
Cabot Mfg. Co.	88	86¾	Monadnock Mills	1017	950
Chicopee	102½	103¾	Nashua	542½	542
Continental	88¾	87	Naumkeag	128	126½
Dwight	1175	1005	N. E. Cot. Yn. com	70½	70
Edwards	116	115	Pepperell	300	300
Everett	130	127	Trem't & Suffolk	129½	112
Franklin	114¼	106½	York Mfg. Co.	138	140

the hands of the retailers, creating the assumption that large stocks are still in hand sufficient to take care of the early wants for next winter's trade.

In certain quarters a little interest is being shown in fancy and highly colored goods for immediate delivery, but the orders received have been small.

There is a general feeling that prices for goods will be no lower on account of the strong position in which the raw material is found and no one anticipates that cotton will vary much from 10 cents a pound in the New York market.

Importers have been particularly busy of late in bringing in goods from abroad, in anticipation of higher duties on foreign goods, which will have a tendency to raise the price not only of foreign manufactures but domestic ones. In fact, the tariff question is receiving as much attention as any feature of the trade, and there is an inclination to wait for developments in this respect before much business is consummated.

The knitting mills in the neighborhood of Utica, N. Y., are running full time and many of them are operating some of their departments overtime, and the belief among manufacturers is that production will remain normal during the summer.

Makers of high grade balbriggans are having a lull, due, it is said, to the strenuous advertising campaign on behalf of men's underwear made of nainsook. There seems to be among the Utica mills no let up in the demand for sweaters and sweater coats, and mills making these goods have orders for many months ahead.

There is some complaint among the knit goods manufacturers in the Mohawk Valley, N. Y., that they can not get sufficient help for normal production. The consequence is that manufacturers are on the constant look out for help. More trouble in this particular is expected when the summer hotel season opens.

The Textile Mill Situation in New England and the South.

NEW ENGLAND MILL SITUATION.

(*Special Correspondence.*)

The market for cotton goods in New York and the New England States has shown a marked degree of firmness during the past four weeks, due largely to the higher price for the raw material, the approach of warmer weather, when cotton fabrics will move from the retailers' shelves, and the assurance that tariff legislation will not have an unfavorable effect upon domestic manufactures. The yarn market, and the demand for textile machinery, have gradually improved since the middle of March with an upward tendency in quotations. Textile mill stocks hold at best prices, with no offerings of the gilt-edge issues.

There is a widespread feeling of assurance, among the cotton manufacturers in this section of the country, that the cotton industry has regained its equilibrium again and is leading all other industries in the march for prosperity. Better prices are being secured for all fancies, while print goods have been advanced twice since the first of March. No doubt the fundamental reason for this improvement in price is the upward tendency in the price of the raw material, although the advent of spring with its increasing demand for cotton fabrics, has caused a great many retailers to rush to the markets for all classes of light weight and fancy fabrics.

The Tefft Weller concern has had an excellent sale of camilla batiste and Le Roy chambray, while cotton taffetas have been in especial request for the Western trade. Cambrics have let up a trifle, although mills on this class of goods are sold ahead for many months, and at prices that show a substantial profit. Ginghams are very scarce and spot buyers are much concerned over the outlook. Both staples and fancies are sold far ahead with no prospect of near deliveries on new contracts at prevailing prices.

The market for cotton ducks has braced up only slightly since the turn of spring, and selling houses handling this class of fabric are rather discouraged over the situation. Heavy army ducks are going very slowly, while 8 and 10 oz. ducks are moving more actively, though in small quantities. Southern ducks appear to be in better request than the higher priced Northern goods. Drills and twills have eased off slightly in volume, but hold near best prices. The export demand for drills has been spasmodic. Quite a few large lots of standard drills have been shipped this month to China at a price of 6¾ cents. There are a large number of inquiries from the Red Sea trade for drills and the announcement of several large orders for Laconia goods is hourly expected.

The total domestic exports since January 1 is in excess of $4,900,000 or $1,700,000 more than for the same period last year. The South American trade is urging deliveries of staple prints on contracts placed in January for April delivery, and are making inquiries for renewals at current prices. Exporters say renewals at to-day's prices are impossible unless deliveries can be made in May and early June, and even at these terms they feel that they are making a substantial concession. It is likely that the export trade will be somewhat quieter until after the middle of May when in the Orient there will be a new season for cotton fabrics.

The rise in the market for raw cotton has been a powerful ray of hope to the spinners who have been watching for an uplift in prices for over a year. Prevailing prices of yarns are slightly below the bottom reached last year—too low for the profitable conversion of the raw cotton, and unless there is an improvement in prices there will have to be another curtailment among the mills. At present prices, there is no profit in the standard counts, and business is being taken simply to keep spindles moving or the stock room from congesting. There are large stocks of cotton yarn on hand that must be moved before prices can advance in proportion to the advance in the raw material. Spinners are eagerly soliciting business to stave off a shutdown, even at no profit or a slight loss.

About the middle of April several sales of a quarter of a million pounds of 2-20s and 2-30s warps were reported and prices were 16½ for 20s and 19¼ to 19⅝ for 30s. Single 12s Southern warps have advanced to 15½, and 24s to 18 cents strong. Many mills are asking 20 cents for 30s two-ply, but which can be bought at 19½ for small lots, and a firm bid of 19 cents for a large lot would place the order.

Underwear mills are buying more yarn lately, but insist upon a better quality. It is believed that some of this buying is for speculation and not for consumption. Hosiery yarns are quiet with an easy demand. The Philadelphia yarn trade is very quiet with little indication of an improvement until surplus stocks are reduced.

There is greater activity among the textile machinery concerns with prices strengthening and deliveries more difficult to obtain. Loom builders are rushed with orders while repair parts have been in greater demand the past two months than for over two years. The reason for this is that parts were taken from idle looms last year to keep the working looms running, and now that the idle looms are being restored to activity there is an urgent necessity for parts. The silk trade has stimulated the market for heddles and harnesses, in fact, the Crompton & Knowles Loom Works have had a greater business among silk mills since the first of January than the entire year of 1908. This report has also been made by the Stafford Co., and Kilburn, Lincoln & Co., who are making a strong bid for the silk trade.

The Draper Co., and the Whitin Machine Works have taken large orders for machinery and are making slower deliveries than anticipated. Orders that are being taken to-day are at a satisfactory margin of profit while those taken a year ago were at a very small profit. Both of these concerns are filling large Southern orders for looms to be shipped during the summer months, and have taken a number of large orders for spinning machinery for early fall delivery. A representative of the Saco & Pettee Machine Shop stated to the writer that business in their line was unusually good and orders were easier to secure than at any other time within the last two years. He expressed his confidence in the permanency of the improvement, and the opinion that there would be a still further improvement before the summer months set in. The capital shares of this concern are selling at $325 on an 8 per cent. dividend rate, but the inside facts are that there is a very small issue of stock and the concern is earning from 40 to 70 per cent. annually on its capitalization, and after retiring an issue of preferred stock will pay extra dividends on the common stock.

The market for textile mill shares holds at top prices with no tendency to sell even though the income return is less than can be secured in savings banks, as is the case in several instances. The Bates Manufacturing Co., Lewiston, Me., pays 10 per cent. and sells for $250 per share, or an income basis of 4 per cent. This concern has an enviable reputation in the seersucker trade, but if it desires to maintain this position there must be at least $1,500,000 spent on buildings and machinery during the next few years. The writer is familiar with the details of this property and believes that a great deal of building must be done to take care of the machinery. The map of the plant is very unsatisfactory as there are a number of old style buildings not situated for the greatest economy of production or suitable to house the new machinery imported during the past year. Although Bates has a surplus account of over $1,250,000, a large part of this will probably be put into buildings, extensions and equipments rather than into extra dividends that are being talked about. It is possible that the directors may decide to pay an extra this year, but if they do it will be with the understanding that it will be the last for some few years. Bates must be modernized if she is to hold her present commanding position in the seersucker market.

Other Lewiston, Maine, cotton mills, such as the Androscoggin and the Hill hold at best prices with light offerings. The Hill Manufacturing Co. is building a new plant that will be operating in the early part of 1910. The Androscoggin has discarded all but fifteen of its old bag looms and is running automatics in their place. This mill is sold ahead and looks for an increasing demand for its fabrics.

The State of Maine cotton mills as a whole are enjoying prosperity and large earnings will be reported this year. The York Manufacturing Co., and the Pepperell are making extensive additions and planning for a big increase of production to take care of the anticipated prosperity beginning with 1910. The Pepperell stock is selling at $303 per share while there is no York offered at better than $142, or an advance of $4 per share over the last sale. Pacific stock holds firm at $3,440 per share with transactions nearly every week. It is expected that the par value of this stock will be reduced from $1,000 to $100 at the annual meeting this year. Pressure is being brought to bear on the treasurer and directors, and it is believed that the reduction will be made at an early date.

The stock of the New Bedford mills continue to hold at best prices, while every now and then a specialty is picked out and advanced. The Taber has been taken in hand and rushed up to $105 where it looks more like a sale than a purchase. There are two new mills planned for this winter by New Bedford men, and a large part of the capital has already been subscribed.

Fall River stocks have eased off slightly as a reactionary movement, but as there are few offerings and a great many "buy" orders it is not believed that the reaction will go very far. Fall River mills are in excellent condition and are making very satisfactory dividends.

SOUTHERN MILL SITUATION.

(*Special Correspondence.*)

There was witnessed the latter part of April a considerable improvement in the yarn situation. For two years' past, the yarn market has been in a state of demoralization, and this is almost the first indication of any substantial improvement whatever. During this period Southern mills have curtailed to a large degree, both those on hard and soft yarn, but prices have been persistently low, demand dull, and general conditions unfavorable. The advance in the price of cotton has done much to boost prices, and if cotton continues the upward trend the results will be reflected in better conditions affecting the yarn trade. There are other reasons for the revival in business experienced recently. One reason may be that knitters are satisfied the tariff bill will not be modified so as to seriously affect them. Still another, and, perhaps, one of the best, is the fact that since the meeting held in Charlotte several weeks ago by the Southern Hard Yarn Spinners' Association, yarn mills, as recommended, have been curtailing production as much as possible. As will be recalled, mills were advised to cut down their output at least one third. Asked for a statement regarding the general situation, and the amount of curtailment, Secretary T. W. Crews, Charlotte, said among other things:

"All the Southern hard yarn mills are curtailing as best they can. The yarn market seems to be a little bit firmer. At present there is a great demand for yarns, but we have

advised the Southern mills not to accept any orders at the present prices. With cotton advancing at the present rate, the yarn market should be in better condition in a short while. Most quotations are on the old basis, the buyers trying to place long contracts at the old prices, which shows that the general thought is that the market has reached rock bottom. Business would be better if the mills would only accept enough orders to run on, and avoid the long time contracts."

As an instance of the increase in the price of yarns, 24s two-ply, which were sold at 17½ cents two weeks ago, are now selling for 19½ cents, and most mills are asking 20 cents. Soft yarns have shown a greater advance in quotation than hard yarns.

A prominent mill man of Charlotte, who is well posted on the general situation in the South, has this to say of the export business:

"Trade for export is improving and it is stated that many Southern mills are getting orders from China and the Red Sea for shirtings, sheetings and drills. Six or eight weeks ought to develop the great bulk of the export cotton business, and this will give sufficient work to the mills to keep them running till the midsummer months. Practically all the export mills of the South are sold up for six months on a basis at which they can make some profit."

That there is a good market in Cuba for American made, and especially Southern made, goods, is shown by W. A. G. Clark, Raleigh, N. C., special agent of the Department of Labor and Commerce, who is investigating conditions in Cuba. Mr. Clark has been conducting these investigations abroad for two years past. Regarding the outlook in Cuba, he reports that there are a number of lines of cotton goods on which American mills can secure business which are now being neglected. He specially cites the denim trade, as even the policemen in Cuba wear uniforms made of denim. Denims are practically all purchased in England on account of their having a wiry harsh feel, whereas most of the American goods are now made with a leathery feel, which is demanded in the home market.

S. B. Tanner, ex-president of the American Cotton Manufacturers' Association, who lives in Charlotte, N. C., has this to say of the improvement in export business among Southern mills:

"The comparatively large demand for goods for China during the past few weeks,—probably twice the amount purchased during the entire two years preceding, with prospects of more,—has given a much better tone to the cotton cloth market, and on some numbers of yarns. Unfortunately some counts of yarn have been produced more rapidly than the trade could use them, but this condition of affairs will soon end.

Textile Machinery Exhibits.

(Continued from page 262 d.)

The exhibition made by the Cooper-Hewitt Electric Co., New York, and 161 Summer Street, Boston, illustrated a means of satisfying the growing need of better mill illumination. The almost shadowless illumination produced over the looms and combing machines, and the fine example of the illumination of a thread in the drawing-in machines of the American Warp Drawing Machine Co., attracted much attention and suggested the possible use of Hewitt lamps for mill illumination.

The Harriman Engine Co., Boston, Mass., exhibited the rotary steam engine that recently made the unprecedented record in tests at the Massachusetts Institute of Technology. This engine is the invention of J. E. Harriman, Jr., civil and consulting engineer. On June 1st he will exhibit an internal combustion rotary engine made under the same patent and same general principle. He also exhibited a threadless nut and bolt, a threadless pipe union, a threadless rod connection and a nut lock, all on the principle of the eccentric.

The Oneida Community, Ltd., Oneida, N. Y., and Brown Bros. Co., Providence, R. I., held their exhibits jointly in the same space. V. W. Lee, Eastern sales manager, 395 Broadway, New York City, represented the interests of the Community and presented the good points of its loom friction chains which were displayed in various sizes.

The Draper Company. C. E. Lovejoy was in charge of this company's exhibit.

A great deal of interest was displayed in the exhibit of the Coldwell-Gildard Co., Fall River, Mass. A single loom was shown fitted with the "C & G" electrical warp-stop motion. The feature which made the strongest appeal to the mill men was the remarkable simplicity and unfailing reliability of the stop-motion. The loom was weaving a piece of plain goods of the following construction: count, 96x96; warp, 60's; filling, 70's. Many thousands of these stop-motions are in operation in the largest mills all over the country, and with positive success in every case. The "C & G" makes an actual net saving in weaving expenses of 25 to 33 per cent., completely eliminates "seconds." The Charlotte Supply Co., Charlotte, N. C., has been appointed Southern agents for the Coldwell-Gildard Co.

The United States Finishing Co., New York, showed some finished goods in the space occupied by the Whitin Machine Works.

Tavella's shuttleless loom was exhibited by Hector Chiarigliione, president and secretary of the company manufacturing it. It carries 15 to 20 different fillings. Mr Chiarigilione is also publisher of L'Unione, Italian weekly newspaper, 326 Victoria Ave., Pueblo, Col.

E. H. Jacobs Mfg. Co., of Danielson, Conn., was represented by W. Irving Bullard, with a complete exhibition of lug straps and loom pickers. The company will send free samples to any one anywhere on earth.

The Leatheroid Mfg. Co., Kennebunk, Me., was represented at the exhibit by B. F. Wyman, traveling agent. This concern had a splendid exhibit of mill baskets, doffing and filling boxes, also warehouse and factory cars.

Kilburn, Lincoln & Co., Fall River, Mass., made a specialty of Patten's improved dobby. The company was represented by A. R. Patten, and is now bringing out new looms in six different models for cotton and silk weaving.

The Dodge Manufacturing Company, Mishawaka, Ind., had a very attractive exhibit, in charge of its Boston branch, George U. Poole, manager. The exhibit was run by an American system of rope drive, made as complicated as possible by angles and reverse turns. Friction clutches were shown, split and solid. The split clutch can be placed on any shaft without taking down. Iron spider pulleys with wood rims, split iron pulleys with interchangeable bushings, wood split pulleys were also shown. The company also had a small capillary exhibit running, showing how a small wood block by capillary attraction can draw oil enough to feed the box. The boxes used were some that have been in actual operation one year without replenishing the oil in the reservoir.

NEW MACHINERY AND TRADE NOTES

A TRAVELER MAGAZINE.

One of the regular expenses of operating ring spinning frames is the replacement of travelers. This expense, which amounts to a large sum in the aggregate, is due to two causes. First, the actual wear, and second, the loss of travelers which are never used at all. The number lost or thrown away is estimated by spinners to be fully as great as the number actually used. Observations in spinning rooms show travelers distributed the entire length of creel boards, also in pockets of doffers and other convenient places from which they are later dropped to the floor or thrown away.

D'Olier Engineering Company, Philadelphia. We are in receipt of a catalogue published by this company on "Horizontal Centrifugal Pumps." Among the many descriptions and illustrations relating to the manufactures of this company may be mentioned the following: Three-stage turbine pump direct connected to electric motor; double suction electrically-driven pump suited for handling large quantities of water at low head; single suction, single-stage volute pump direct connected to electric motor; single suction volute pump with outboard bearing, direct connected to electric motor; four-stage turbine pump. Those in want of pumps should write for this catalogue.

Duckworth's Patent Traveler Magazine.

Travelers have a faculty of bunching together as shown in illustration, so that it is difficult, if not impossible, to separate them without loss.

The Duckworth traveler magazine illustrated, made by the Draper Co., Hopedale, Mass., takes a bunch of the travelers, and in regular operation drops them singly so that there is no excuse for losing travelers in handling. A comparison of the two illustrations tells the whole story.

Western Electric Company, New York. Those in want of inter-communicating telephones should write this company for its circular No. 1103. These telephones are noted for their efficiency, simplicity and reliability, and have been put on the market to meet an increasing demand for inter-communicating telephone service. These equipments will satisfactorily meet the requirements of every kind of service and are carefully designed and have an attractive finish. Careful construction insures for them an

extremely low maintenance expense and absolute reliability. As a telephone operator is not required there is practically no operating expense; further, the system is for use at all hours of the day and night.

MAYO KNITTING MACHINE & NEEDLE CO., Franklin, N. H. This company has issued an illustrated folder relating to its machine known in the trade as the "Acme," which is most rigidly and substantially constructed, and with its recent improvements it is built to operate successfully at any speed that can be reasonably desired, limited in this particular only by the quality and nature of the yarn used, and what the construction of a latch needle will endure. This machine can be built to run with either of three different speeds during the knitting of the heel and toe, so that a manufacturer can have a choice as to which speed he prefers, according to the conditions in his mill or the class of work he is making. It is built in all quarter-inch sizes from 2 inches diameter to 4½ inches diameter, and with any number of needles desired from 3.1 to the inch to 21.8 to the inch.

SHIRREFFS WORSTED COMPANY, Fitchburg, Mass. This company made the cloth for President Taft's inaugural suit, samples of which have been sent to us, and these certainly show a high grade of American manufacture, in the quality of material, in design, and finish.

DARY RING TRAVELER CO., Taunton, Mass. This company claims to have improved upon the existing methods of manufacturing high grade travelers, and believes that the value of ring travelers is measured by what they do and not by what they cost. We would suggest that those interested, write to this company and ask it the reason why it makes the claims that it does, and in what particulars its travelers are superior.

HUMIDITY. The Bell Pure Air & Cooling Co., New York, has issued a little book on humidity, with special reference to its air moistening apparatus for textile mills and for other purposes, which is well worth securing and perusing, as it contains many valuable points in reference to the moistening of air.

LABOR AND WAGES. The Annals of the American Academy of Political and Social Science, Philadelphia, for March, is devoted exclusively to the subject of labor and wages, upon which valuable contributions have been made, among which may be mentioned the following: "The Future of Labor" by Andrew Carnegie; "Condition of Labor in Southern Cotton Mills" by Lewis W. Parker; "Recent Massachusetts Legislation" by S. S. Baldwin; "Pay of Labor in New England Cotton Mills" by John Golden; and others of like character relating to various industrial branches in manufacturing and agriculture.

HUSSONG DYEING MACHINE: The Ivins Dietz & Metzger Co., Philadelphia, commenced with the using of two machines for dyeing made by the Hussong Dyeing Machine Co., Groveville, N. J., and has now ten in use and is ready to strongly recommend these machines, and is willing to show them in operation to any one who desires to see them. The company is ready to recommend them in the strongest terms for economy and efficiency of operation.

REVOLVING PORTABLE ELEVATORS. The New York Revolving Portable Elevator Co., Jersey City, N. J., offers to the trade a handsomely illustrated catalogue relating to its revolving portable elevator for use in the warehouse, store room or factory. This elevator moves objects weighing up to 1,000 to 1,200 pounds, and raises them to any required height up to ten feet. It makes it possible to use all of the storage space in a warehouse, or other building, without the tremendous amount of physical labor necessary to hoisting or tiering boxes, barrels, or bales in the usual way.

FIRE HOSE. The Eureka Fire Hose Mfg. Co., New York, issues a handsomely executed catalogue of its fire hose and supplies for fire departments, railways, steamships, wharfs, factories, hotels, public institutions, etc. Those in want of anything of this kind should write the company for its catalogue.

FRANK B. GILBRETH, New York City, is engineer in the development of 100,000 h. p. equipment at Grand Falls, Province of New Brunswick, material for which is now being received, consisting of engines, boilers, steam drills, and other machinery for the beginning of operation.

INSTRUCTIONS FOR OPERATING RIB KNITTING MACHINES. This is the title of a pamphlet issued by Stafford & Holt, Little Falls, N. Y., which they will send to any one asking for it. It furnishes instructions on how the stitch is formed; the operation of the machine; dial cap; cylinder and cam ring; the take-up; and a description of the knitting process.

METAL ROOFING. Valuable information concerning metal roofing is contained in the April number of Cortright Metal Shingle Advocate, published by the Cortright Metal Roofing Co., Philadelphia.

CROCKER-WHEELER CO., Amphere, N. J. A large order has been booked by this company for fourteen 3-phase, 60-cycle squirrel cage induction motors, aggregating 220 horsepower for Johnson & Johnson, New Brunswick, N. J.

THE SOLUBLE SOFTENING OIL, manufactured by the Arabol Manufacturing Company, New York, gives a smooth finish to warps, the threads divide well in the lease rods, and the cylinders of the slasher remain perfectly clean.

THE TERRY STEAM TURBINE CO. has transferred its sales department from the works at Hartford, Conn., to 90 West Street, New York City. Frederick D. Herbert has been appointed general sales manager.

THE UNITED STATES PRINTING COMPANY, with factories located in Brooklyn and Cincinnati, is constructing a modern reinforced concrete and brick fire-proof factory at Norwood, Ohio. The new building, 300x377 feet, four stories high, is equipped with up-to-date machinery and its facilities are the most complete and extensive of any color printing house in the United States. A fourteen page booklet, handsomely printed in ten colors with embossed cover and embracing serviceable suggestions for any manufacturer or advertiser, has recently been issued by this company and will be mailed free upon request by addressing their main Eastern office, 50 North Third Street, Brooklyn.

Hipwell, Schooley & Morse, 17 West 42d Street, New York, well known public accountants are particularly well equipped to take care of all classes of audits and examinations. Apart from the actual verification of existing records and the preparation of certified financial statements therefrom, they serve their clients to advantage in matters relating to accounting economies and production costs.

Stafford & Holt, Little Falls, N. J., have recently replaced all other makes of latch needle knitting machines used by the A. C. Staley Manufacturing Co., South Bend, Ind., having sold and installed for them a set of 25 of their latest automatic ribbed underwear machines.

The Detroit Graphite Company, paint makers, Detroit, Michigan, has just issued a very neat and attractive booklet descriptive of the repainting of the Poughkeepsie bridge. This bridge is one of the longest in the world and the enormity of the work in preparing the bridge, as well as the painting itself, is very attractively set forth. The book is one which every engineer should have in his possession and this company will cheerfully send the same upon application.

The Draper Co., Hopedale, Mass. It is reported that this company closed last month the biggest contract for looms ever taken by one concern. It amounted to around $550,000 and was for the Pepperell Manufacturing Co., of Biddeford, Me.

Converse, Stanton & Company. the dry goods commission merchants for a large number of New England Mills, have removed part of their stock from their New York headquarters to South Brooklyn, along the government channel, in order to be able to take advantage of the superior shipping and receiving facilities of that section of the city. The firm wlil retain its present building, at No. 85 North Street, in the heart of the city's wholesale district, largely for show purposes.

A BELT DRESSING.

The Superior Chemical Mfg. Co., Grand Rapids, Mich., makers of the well known "superior bar belt dressing" reports that The American Car & Foundry Co., renewed their contract with them for one year's supply for all their plants, using from 15,000 to 20,000 pounds of dressing. The Textile Mill Supply Co., Charlotte, N. C., handles the dressing in its section.

With this dressing one gets 30 per cent. more dressing. To those who have never had the goods, the company will send a full sized bar to test for quality and learn the metal-end advantages, and it will be sent prepaid to those who will give their employer's name and position.

No dye is fast all round, nor should we have much use for one did it exist. If the article is worn out by the time the color is much faded the dye may be stated as fast.

As modern taste shows an increasing tendency towards pronounced colors. it is evident that, for the present, at least, something must be done to replace these unsatisfactory dyes, or to find ways of using them which will brighten the resulting dyeings.

POINTS ON DOBBIES.

BY N. E. TURNER.

There are four ways of obtaining a larger or smaller shed: First, by having the knife almost in contact with the hooks, which will increase the size of the shed, or by placing it further back, which will decrease the shed. Second, by moving the swivel in the slot at the end of the back rocking lever. Third, by moving the swivel in the slot in the driving gear of the dobby. Fourth, by grading the harness wires in the notches at the top of the harness levers. The fourth way is the best, for the harness will rise higher, and descend correspondingly lower, which will allow the yarn to lie closer to the race plate and have a good clear shed. The back rocking lever ought to be longer than the front lever, because the back harness requires to be lifted higher than the front harness.

Do not work the back end of knife out too far, for this is often the cause of mispicks. The knives and hooks are worn away sooner, needles are sprung and bent, in fact there is trouble all around. The defects are caused as follows: When the back of the knife is passing out too far, it causes the hooks that are on the knife to slide toward the front end, and be it ever so little it means friction; and the finer the dobby the greater is the possibility of the hook that is sliding binding the needle that controls the hook that has to be raised on the next pick.

A slightly worn knife will cause mispicks when changing from one pattern to another with more harnesses, especially if the cloth is formed by two or three different stripes.

The best test as to whether the hooks are fixed right or not in the jack, is to hold the jack with the points of the hooks together; take one of the hooks, and if it can be moved to either side of the other hook, it is all right. Try the other hook the same way, and if fixed in this manner the hooks should not bind.

In cambrics, nainsooks and jacinets, a smooth soft finish is required as a rule. These classes of goods need little finishing, the filling being the main point.

In cambrics a thick full smooth feel is sometimes required, the quantity of filling to be regulated by the class of cloth under treatment.

In giving a batiste finish careful and strict attention is required to get correctly the variety of handle and finish required by the different markets.

It is absolutely impossible to give a good batiste finish if in the first process the goods are allowed to run awry, finally arriving in the finishing room with the weft pulled out of square, or any damages or bad sewings in.

It has been found that when artificial silk has been dyed with direct cotton dyes the depth of the shade may be regulated by subsequent steaming, or by employing a suitable temperature in drying.

Eighty-three per cent. of the textile manufacturers of North Carolina oppose the working of children under twelve years of age in factories, 6 per cent. of them are favorable to the proposition, and 11 per cent. are indifferent.